

Industry Initiation Report

US Coal Production

Outlook cooling amid warming climate

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- ❖ Coal Industry currently 114% overvalued.
- ❖ Continuing decrease in electricity demand further reduces outlook for the industry in short- and medium term
- ❖ Prospects of new sources of natural gas and gas prices trended downward are putting additional downward pressure on forward coal prices
- ❖ Expiration of forward 1-year contract will force coal producers to strike new supply agreements at less favorable prices
- ❖ Cap & Trade legislation not likely to impact current coal-fired power plants.

SUMMARY:

Coal Industry currently 114% overvalued: Based on a DCF analysis which factored in flat-to-down growth in most coal markets and a falling price, the US coal mining industry is richly valued at 7.0x EV/EBITDA. Our analysis suggests EBIT will fall by 33% in the next 12-18 months, further inflating the multiple. Thus, we are recommending an Underweighting of the industry.

Falling Electricity Demand: Annualized monthly US Industrial electricity consumption fell 19.7% from November of 2007 through June 2009. This, coupled with a decline in natural gas prices, led to an 11.1% decrease in coal consumption by electricity generators between June 2008 and June 2009.

Natural Gas Prices Putting Downward Pressure on Coal Prices: Natural gas prices are \$4.91 per billion Btu vs. \$9.11 a year ago. Due to slack demand and increased supply spurred on by the high prices from 2005-2008, these prices will not significantly rebound. Coal-fired power plants are currently running at 57% utilization versus 67% a year ago while natural-gas utilization has been roughly flat. As natural gas erodes coal's market share, coal prices will begin their inevitable trend downward.

Expiration of forward 1-year coal contracts: Prices and deliveries of coal have been sustained by contracts negotiated during an environment of peak energy prices. As these contracts begin to expire, power generators will scale back their orders as stockpiles have built due to weak demand for electricity. Furthermore, prices will be reset downward to match the change in substitute fuels.

Cap not likely to impact current coal-fired power plants but will affect new plants: Although suggested carbon cap-and-trade legislation provides mechanisms to reduce carbon emissions from the industry, it also anticipates a more relaxed procedure for obtaining emission permits by coal-powered power plants built before 2009. 5% of emission permits will be issued for free and grandfathered plants will not be required, at least in the first years of cap-and-trade program, to reduce their emissions. New installations, however, will have to reduce their carbon footprint, which will effectively make their cost of production equal to or even higher than the one of the gas-fired plants.

Table 1: Top 10 US Coal Companies (by Market Cap), Selected Data

Top 10 US Coal Companies data summary								
Company	Market Cap (\$M)	EV (\$M)	TM Total Revenue (\$M)	EBITDA (\$M)	EV/Total Revenue	EV/ EBITDA	P/E	Beta
Peabody Energy Corp.	10369	12713	6601	1726	1.9x	7.4x	11.8x	1.49
CONSOL Energy Inc.	8435	9499	4672	1310	2.0x	7.3x	14.9x	1.42
Arch Coal Inc.	3659	5053	2735	514	1.8x	9.8x	18.4x	1.61
Alpha Natural Resources, Inc.	2709	2487	2232	321	1.1x	7.7x	21.5x	1.49
Massey Energy Co.	2685	3366	2959	563	1.1x	6.0x	15.7x	2.14
Natural Resource Partners LP	1445	2016	278	254	7.2x	7.9x	13.7x	0.79
Alliance Holdings GP, L.P.	1270	1627	1230	309	1.3x	5.3x	12.6x	0.78
Patriot Coal Corporation	1134	1289	2073	402	0.6x	3.2x	4.8x	
Walter Energy	3126	3419	1447	481	2.4x	7.1x	8.7x	1.95
Foundation Coal	1606	2175	1674	308	1.3x	7.1x	45.4x	
Total	36436	43644	25901	6187				1.46

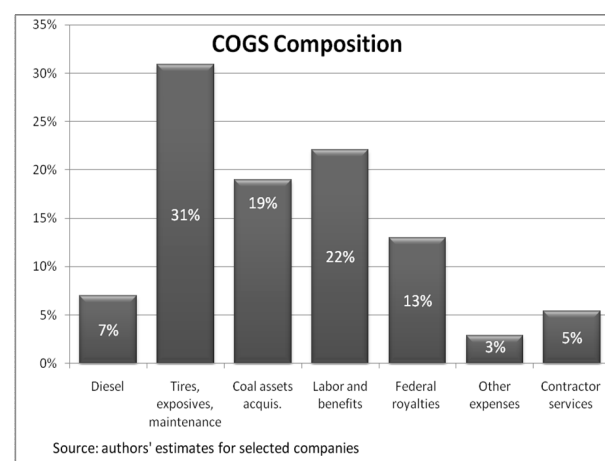
Source: Capital IQ

Coal Industry Overview

Coal has been and continues to be an important energy source for the United States. In fact, prior to the emergence of petroleum based fuels, coal was the U.S.'s dominant energy source. Today, coal is mined throughout the country, and there are 43 companies with annual U.S. coal production of over 1 million short tons each. While environmental concerns related to sulfur, nitrogen, and green-house gases prevent coal from gaining widespread acceptance and create questions concerning its future viability, its cost-effectiveness and relative abundance drive its continued use. Currently, coal fuels approximately half of all U.S. electricity generation and is used for metallurgical and other industrial applications. For these reasons, coal mining is an important sector of the U.S. economy and understanding the dynamics of this industry is essential to making informed investment decisions.

Coal Mining

Coal is mined using two different methods: surface and underground mining. Surface mining has grown at a rate faster than underground and is generally less expensive to conduct. Surface mining is associated with stripping the area, i.e. removing overburden rock from the top of a coal seam. The amount of rock removed per ton of coal during stripping is characterized by strip ratio which directly translates into cost of coal production. Underground mines require much greater initial capital expenditures and are constructed to access the deep, most valuable coal resources.



Analysis of the composition of costs included in the cost of coal sold for the selected companies (see bar chart) shows that while supplies - like tires, fuel and explosives - and maintenance altogether account for 38% of cost of coal produced, labor-related expense is the largest single expense due to high

unionization in the industry and higher benefits and insurance costs. Most of the coal producers also actively replenish their coal reserves, resulting in asset acquisition cost share of 19%.

Industry Structure

The coal industry is highly competitive with a large number of coal producers whose share of the market constitutes less than 1%. Only three companies have market share over 10% (Table 2). Barriers to entry include the cost of coal reserve acquisition (through lease or purchase) and construction and environmental permitting. All companies who entered or increased their presence in the US coal market during the last year have done so by purchasing mine rights or acquiring existing companies. The low-cost producers are those who develop economies of scale and acquire and subsequently manage reserves to obtain and maintain a favorable, low-cost strip ratio.

Table 2: US Coal Producers

Major U.S. Coal Producers - 2008 (Million Short Tons)		
Company	Production Tonnage	Percent of Total U.S.
1. Peabody Energy Corporation ¹	200.4	17.1%
2. Rio Tinto Energy America ²	144.0	12.3%
3. Arch Coal, Inc. ³	140.0	12.0%
4. Foundation Coal Corporation	69.4	5.9%
5. CONSOL Energy Inc.	65.1	5.6%
6. Massey Energy Company	41.0	3.5%
7. Patriot Coal Corporation ⁴	35.7	3.0%
8. Kiewit Mining Group, Inc. ⁵	35.1	3.0%
9. North American Coal Corporation	32.6	2.8%
10. Westmoreland Coal Company	29.3	2.5%
11. Alliance Resource Partners	26.4	2.3%
12. Murray Energy Corporation	25.3	2.2%
13. Alpha Natural Resources, LLC	23.5	2.0%
14. Luminant (formerly TXU and Alcoa Mines)	23.1	2.0%
15. International Coal Group (ICG)	17.8	1.5%
16. BHP Billiton	15.2	1.3%
17. Chevron Mining Inc.	11.1	0.9%
18. James River Coal Company	11.1	0.9%
19. Interwest Mining Company (Sub. of PacifiCorp)	9.7	0.8%
20. TECO Coal Corporation	9.3	0.8%
21. Cumberland Resources Corp. ⁶	7.5	0.6%
22. CAM Holding LLC (Rhino Energy and Wexford)	7.2	0.6%
23. Booth Energy Group ⁶	6.8	0.6%
24. Jim Walter Resources, Inc.	6.0	0.5%
25. Black Hills Corporation (Wyodak Resources)	6.0	0.5%
26. Western Fuels Association, Inc.	5.7	0.5%
27. United Coal Company	5.4	0.5%
28. Rosebud Mining Company ⁶	5.3	0.5%
29. Oxbow Carbon & Minerals Inc. ⁶	4.9	0.4%
30. Oxford Mining Company	4.6	0.4%
31. BNI Coal, LTD	4.5	0.4%
32. Vectren Fuels, Inc.	3.5	0.3%
33. Solar Sources, Inc.	3.3	0.3%
34. Doleet Hills Lignite Company (Sub. of Amer. Elec. Pwr.)	3.3	0.3%
35. Cliffs North American, LLC ⁶	3.2	0.3%
36. Appalachian Fuels, LLC ⁶	2.7	0.2%
37. Trapper Mining Inc.	2.3	0.2%
38. Drummond Company, Inc.	2.3	0.2%
39. National Coal Corporation	1.8	0.2%
40. Usibelli Coal Mine, Inc.	1.5	0.1%
41. Freeman Energy Corporation ⁶	1.5	0.1%
42. Jewell Smokeless Coal Corp. (Sunoco)	1.2	0.1%
43. Raven Crest Contracting, LLC	1.0	0.1%
Other Producers	115.0	9.8%
Total U.S. Production ⁷	1,171.5	100.0%

Notes: Figures are rounded. 2008 data compiled from 2009 NMA survey of major producers. May not be all-inclusive. Any companies not included in this listing are invited to submit data for the next edition. U.S. production total for 2008 is an EIA preliminary estimate.

¹ Peabody Energy Corp. production figure includes production plus tons sold, excluding trading and brokerage operations.

² Rio Tinto America production figure includes 50 percent interest in Decker Mine.

³ Arch Coal, Inc. production figure includes tons sold plus brokered coal.

⁴ Patriot production figure includes Magnum tonnage.

⁵ Kiewit production figure includes 50 percent interest in Decker Mine.

⁶ Department of Labor, Mine Safety & Health Administration 2008 preliminary data.

⁷ Department of Energy, Energy Information Administration 2008 preliminary data.

Market Size and Growth

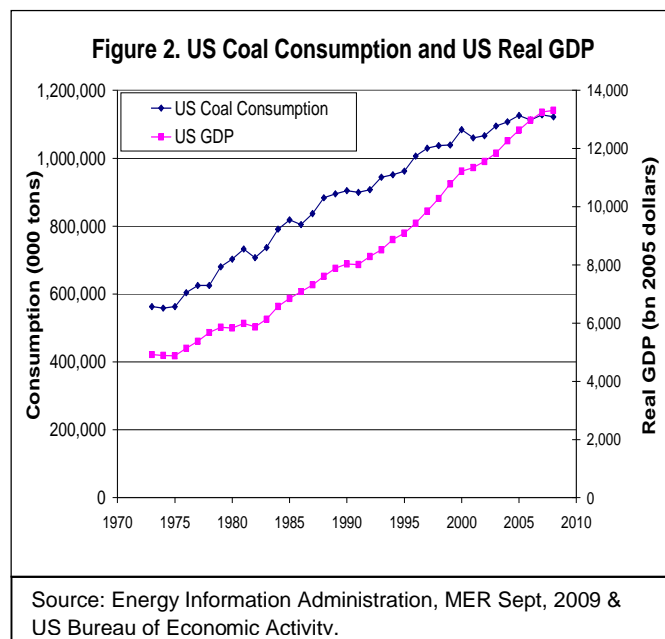
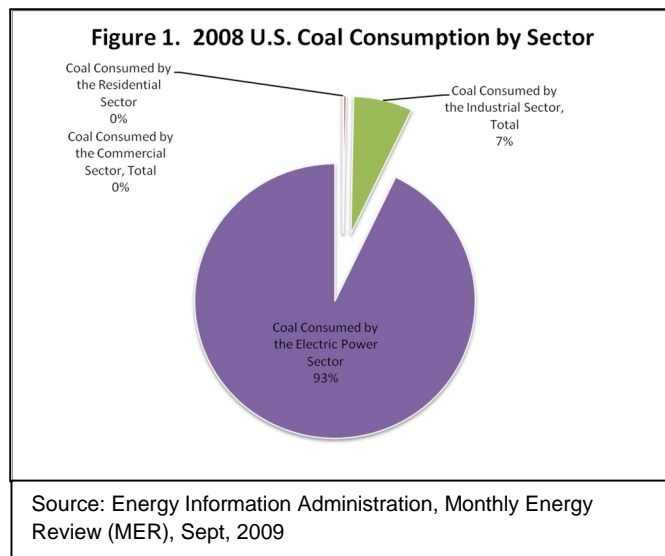
Demand for coal in the United States in 2008 was 1,121.7 million short tons (MST) with 92.9% of this attributable to the electric power sector. Figure 1 illustrates 2008 U.S. coal consumption breakdown¹. With an average minehead price in 2008 of \$32.06² per short ton, the U.S. coal market was approximately \$36 billion.

Owing in large part to steady demand from power generators, overall domestic demand for coal has experienced reasonably stable and decelerating growth for several decades. Growth in annual U.S. demand averaged 0.92%, 1.50%, and 1.99% for the ten, twenty, and thirty year periods ending in 2007. However, demand for coal is not completely independent of the business cycle as demand in the industrial sector is highly correlated with economic growth. In fact, with the U.S. experiencing a recession in the last half of 2008, overall demand fell by 6.3 MST (-0.6%) as compared to 2007. In 2009, the poor economy further accelerated this trend, as coal demand through May was 403,334 MST versus 455,844 MST for the same period in 2008, a decline of 11.5%.³ Figure 2 charts US coal consumption and real GDP from 1973 to 2008.

Natural gas is considered the main substitute to coal for electrical power generation. The Energy Information Administration estimates that, in 2008, new added gas-powered generation capacity was 9.8 gigawatts or 46% of total added capacity. Gas-power plants contribute 41% of the total additional capacity being built in 2009. For comparison, coal-fired plants contribute 43%.

Product Segments

Coal quality can be graded by the completeness of the coalification process that turns decaying organic matter into coal. More specifically, coal is graded by the level of carbon and moisture present within the coal. A higher fraction of carbon and less moisture increases the thermal content of coal giving it a higher grade. There are four categories or classifications of coal based on this grading



¹ http://www.eia.doe.gov/emeu/mer/pdf/pages/sec6_4.pdf

² <http://www.eia.doe.gov/cneaf/coal/page/acr/table33.pdf>

³ http://www.eia.doe.gov/emeu/mer/pdf/pages/sec6_4.pdf

criteria, lignite, sub-bituminous, bituminous, and anthracite. Additionally, coal often contains two impurities, sulfur and nitrogen which are generally undesirable. During the coal combustion process, these impurities are released to combine with other molecules and can create byproducts such as sulfuric and nitric acid. When released into the atmosphere, these byproducts create acid rain which can be very damaging to the environment. Thus, in addition to heat content, the level of these impurities can also be an important factor in product selection of coal consumers.

Lignite

Lignite, also known as brown coal, occupies the lowest rank of coal. It has a carbon content of 25-35% and a moisture content as high as 66%. Due to its low carbon content, lignite has the least thermal content of all coals, approximately 8 – 17 million Btu's (British thermal unit) per short ton. It is used almost exclusively for steam powered electrical generation and is typically consumed near its source because its volatile nature makes it dangerous to transport. In the period from 1998 to 2008, lignite production growth averaged -1.24% per year with consumption in 2008 standing at 75.7 MST (6.5% of US coal consumption).

Sub-Bituminous

Sub-bituminous coal, the second lowest rank of coal, contains 42-52% carbon and has a moisture content of 15-30%. Its heat content ranges from 16.4 to 22.4 million Btus per short ton and typically has lower sulfur and nitrogen content than bituminous coal (discussed later). Sub-bituminous coal is primarily mined in the Western United States and is used in electrical power generation, cement manufacturing, and other industrial uses. In the period from 1998 to 2008, sub-bituminous coal consumption growth averaged 3.31% per year with production in 2008 standing at 534.7 MST (45.6% of US coal production). Some of the growth in sub-bituminous coal owes to its low sulfur and nitrogen content. Due to strict environmental regulations, sub-bituminous coal's low sulfur and nitrogen content make its use versus bituminous coal advantageous, however its lower energy content forces consumers to demand more. These factors combine to shift overall consumption from bituminous to sub-bituminous coal.

Bituminous

Bituminous coal, also known as black coal, is the next rank of coal, containing 60-80% carbon and under 15% moisture. Bituminous coal has a thermal content of 21-30 million Btu's per short ton and can be coked, making it suitable for steel production. In addition to steel production, bituminous coal can be used in the same applications for which sub-bituminous coal is also used, however, as described above, its use is diminishing due to its higher sulfur and nitrogen content. In the period from 1998 to 2008, bituminous coal production growth averaged -1.35% per year with consumption standing at 559.4 MST (47.8% of US coal production) in 2008.

Anthracite

Anthracite occupies the highest rank of coal, containing 92-98% carbon and very little moisture. Anthracite's heat content ranges from 22-28 million Btu per short ton. Anthracite burns very cleanly producing little soot, making it ideal for applications such as hand-fire stoves and automatic stoker furnaces. In fact, Anthracite is the only variety of coal used in residential applications. However, the high price of Anthracite makes it impractical for electrical power generation and other industrial uses, therefore its consumption is fairly minimal. From 1998-2008, anthracite production growth averaged -10.66% per year and in 2008, consumption of anthracite stood at 1.7 MST (0.1% of US coal production).

Geographical Location

In 2008, coal from the Eastern US (east of the Mississippi River) accounted for 42.1% or 493.1 million tons of total U.S. production, an increase of 3.1% over 2007, while companies from the Western US produced 57.9% of total US production or 678.4 million tons, 1.5% year-on-year growth⁴.

Pricing

According to Energy Information Administration (EIA) data, from 2007 to 2008, electricity generators experienced a 14% increase in delivered coal prices, rising from \$36.06 to \$41.23 per ton. Coal prices to the industrial sector (excluding coke plants) were up 17% to \$63.44 per ton. However, unlike prices for natural gas and petroleum, coal price is set on the basis of forward (year-ahead) contracts rather than on the spot market.⁵ Given the regulatory uncertainties described above, negative sentiments of the market, and recent decreases in natural gas prices, our analysis indicates power manufacturers will negotiate lower forward prices for new contracts to be fulfilled in 2010 and 2011. This will apply additional downward pressure to thermal coal prices.

Further adding to pricing pressure, power producers' coal stockpiles will increase in 2009. This is the result of a decrease in domestic power consumption projected to continue throughout 2009 and 2010. These speculations are supported by data showing coal stockpiles in the electricity generation sector increasing by 7.8% in 2008 compared to 2007, up to 163.1 million tons⁶ due to reduced demand. It should be noted that coal producers' inventories, on opposite, decreased during 2008 as deliveries of coal to power consumers continued, in average, at the same rate as in 2007 rate.

Important Industry Trends

Carbon Sequestration

Given the volumes of greenhouse gas emitted by coal-fired power plants, there are very few technologies available to minimize or eliminate emission of carbon dioxide. Underground carbon sequestration is being recognized as a possible means to store carbon within the Earth's strata. So far, there have been at least 3 successful projects: Statoil has been injecting millions of tons of CO₂ into the subsurface beneath the North Sea motivated by high carbon tax imposed by the Norwegian Government; a British Petroleum-led venture has been injecting 1 million tons / year of CO₂ into sub-surface in Algeria; Weyburn oil field in Saskatchewan, Canada has pumped around 250 thousand tons / year of CO₂ transported via pipeline from a chemical plant in North Dakota. With the appropriate selection of reservoir, retention reaches 99% over 1000 years.⁷

Studies have shown that underground sequestration of carbon dioxide would add 3 cents to the price of a kWh of electricity generated by a conventional pulverized coal power plant and 1.5 - 2 cents to power produced at newer Integrated coal Gasification Combined Cycle (IGCC) power plants⁸. Coal gasification is another competing technology that, over medium- and long term may produce a substantial volume of methane to generate electricity and successfully compete on costs with coal-powered plants. Underground coal gasification (UCG) to produce natural gas with simultaneous underground

⁴ National Mining Association, Coal Producer Survey 2008, p.1

⁵ Ibid, p.4

⁶ Ibid, p.4

⁷ Earth: The Sequel, F.Krupp, M.Horn, W.W. Norton & Co, New York, 2008.

⁸ The Cost of carbon Capture. J. David, H. Herzog, MIT, Cambridge, MA, USA.

sequestration of CO₂ is another competing technology. Referring to Figure 5 below, natural gas is currently 1.51 cents per kWh more expensive than coal, so with current sequestration technology, coal becomes uncompetitive, on a cost basis.

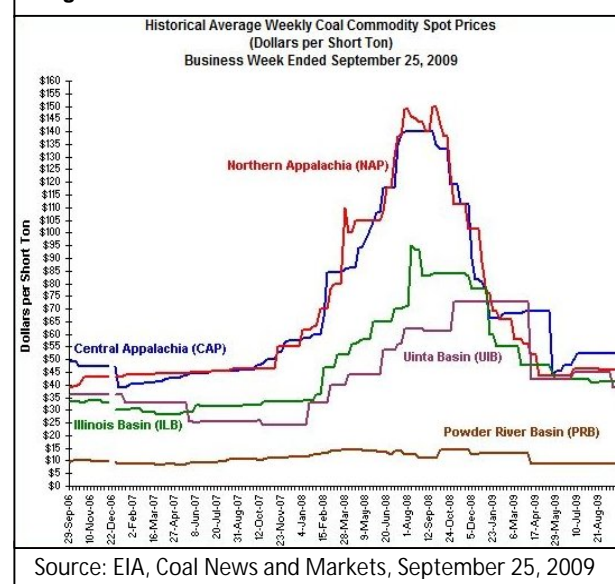
Carbon Tax / Cap & Trade

The Waxman-Markey climate and energy bill, proposed cap-and-trade legislation to reduce greenhouse gas emissions, has introduced additional uncertainty to the industry. Under this act, new coal plants built between 2009 and 2020 are expected to adopt carbon-capture-and-sequestration (CCS) technologies when they become commercially available. The bill also establishes a number of emission reduction targets that coal-fired power plants should abide by. It also stipulates incentives available to those plants that sequester their emissions. This bill has passed the House of Representatives, however, it has stalled in the Senate. It is now becoming increasingly more clear that action to reduce Green House Gas (GHG) emission will be delayed until health care reform legislation can be enacted.⁹ Furthermore, while placing incentives for new plants to sequester carbon, existing coal-fired generators will be awarded pollution credits that will allow their continued operation. It is therefore likely, that any legislation will grandfather the GHG levels of existing plants. This fact allows us to confidently assume that there will be no substantial reduction in the use of existing coal-fired power plants, however, new plants are unlikely to be constructed until the legislation is finalized, removing the uncertainty of future costs. Based on current uncertainty and the likely increase in generation costs described above, we have assumed that no new coal-fired power plants will be constructed following 2012, the year that last of currently permitted coal-fired plants will be completed.¹⁰

All-time High Prices of 2008 Collapse

Owing to contracts signed during a period of peak energy prices, current deliveries to power generators are priced above sustainable levels. According to the 2008 10-K filings of several of the largest coal producers (Foundation Coal, Alpha Natural Resource Partners, and Patriot Coal), in excess of 90% of expected 2009 coal production was under delivery contract by year-end 2008. Figure 3¹¹ illustrates the run-up in coal prices in early 2008 and the subsequent collapse in the second half of 2008 and first quarter of 2009. The drop in coal spot prices and the over 50% drop in natural gas prices from 2008 to 2009 (a substitute for coal for many power generators) are two factors pointing to a drop in

Figure 3: US Spot Coal Prices, September 2006 – August 2009



⁹ <http://www.nytimes.com/2009/09/16/opinion/16wed2.html>

¹⁰ <http://www.eia.doe.gov/cneaf/electricity/epa/epat2p5.html>

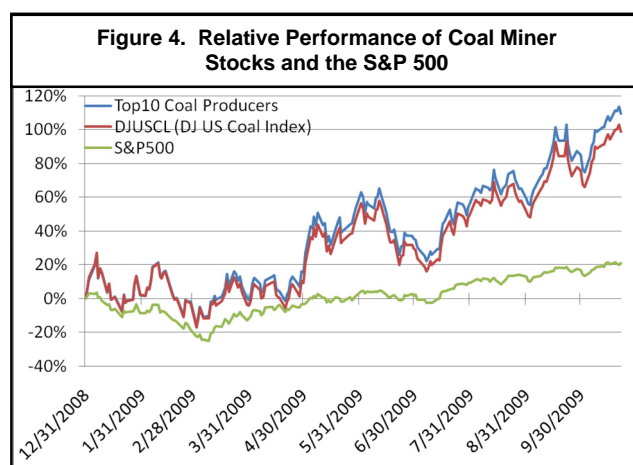
¹¹ Figure 3 depicts coal spot price by region. Coal prices vary region-by-region due to coal quality (thermal content, sulfur content, ash content, etc.) and transportation costs incurred by the purchaser. For instance, coal from the Powder River Basin in the Western US is low in thermal content and primarily shipped to power generators in the Midwest and East, leading to relatively large transportation costs versus coal mined in the East. Both factors contribute to PRB coal's significant price discount to coal from other regions.

future thermal coal contract prices. Further adding to downward price pressures, coal stockpiles at power generators are at multi-year highs due to a significant pullback in industrial electricity demand.¹² Given these facts, coal prices are projected to fall 13% by the end of 2010. This downward pressure on prices will put a substantial squeeze on producers' margins and will significantly reduce earnings. Our analysis estimates that industry-wide gross margins will fall from 28.7% in 2008 to 27% in 2010. Earnings (EBIT) of our index companies are expected to fall to \$3.2 billion in 2010 from \$4.7 billion in 2008. After the rally in their stock prices (over 100% year-to-date), coal stocks are highly overvalued and the upcoming drop in contract prices should provide the catalyst needed for the market to reprice these stocks. Figure 4 illustrates the Dow Jones US Coal Index's performance as well as a value-weighted index of the 10 largest coal producers covered in this report, relative to the S&P 500.

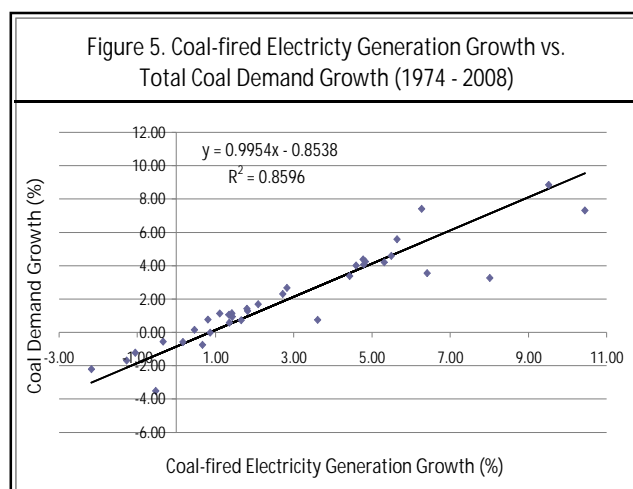
Industry Model and Valuation Methodology

The economics of the coal mining industry have been modeled in three stages. First, production volume is modeled. Next, coal prices are forecast and combined with volume estimates to produce top-line revenue predictions. Finally, production costs are estimated based on the historical relationship between coal price and average industry margin. At this point, a discounted free cash flow analysis is used to value the industry as a whole (in this case, the industry is represented by the top 10 coal producers listed in Table 1.)

To model production volume, the primary markets served by coal producers are forecast. As described earlier, coal producers primarily sell to two market segments: electric power generation and industrial. However, the electric power generation segment consumes over 90% of total coal production and is the primary driver for industry growth. Figure 5 illustrates the high correlation between overall coal demand growth and coal-fired electricity generation growth. As such, to model coal production volume growth, first the overall growth in electricity generation was forecast using historical growth rates. Next, the fraction of total electricity generation expected to be generated using coal is forecast based on installed and forecast coal generation capacity and a regression analysis of coal generation capacity utilization and the price ratio of coal and natural gas. Combining the overall generation forecast with the fraction predicted to be generated with coal, our volume forecast for this segment is complete. Industrial demand growth is modeled based on historical trends.

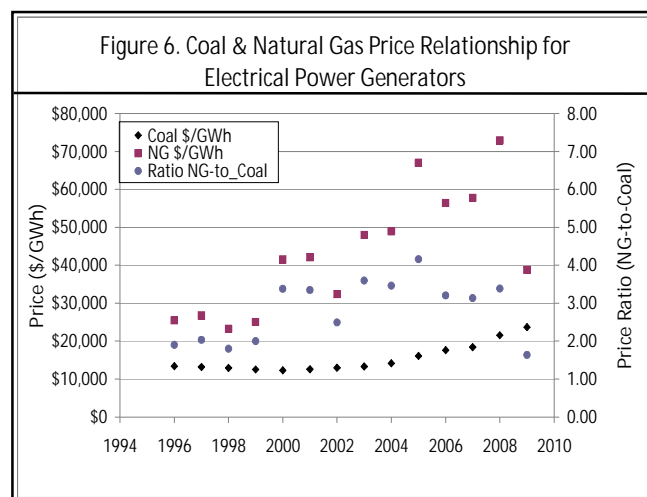


Source: Yahoo Finance, WRDS



¹² Energy Information Administration, Coal News and Markets, September 25, 2009.

The price forecast for coal is driven by the fact that natural gas is a close substitute in coal's major market, electrical power generation. It is our belief that the rise in coal prices in 2008 was largely driven by the corresponding rise in natural gas prices. As coal's major customers were left with no cheap alternative, the coal producers were able to take advantage of the situation and raise prices. However, this has recently reversed with the price of natural gas falling by over 50%, making it an attractive alternative for power generators. Figure 6 illustrates the prices of coal and natural gas, normalized for power generation (\$/GWh). The price relationship is expected, over a five year period, to driven back to a historical value of two driven by the economics of power generation.



Finally, to compute industry EBIT, industry margins are forecast based on the historical relationship between EBIT margin and average coal sale price. This relationship is estimated using a standard linear regression and then applied to future EBIT estimates. At this point, a standard DCF analysis is used to value the industry as a whole. The following subsections describe this process in greater detail.

Demand & Pricing Forecast

Summary

Appendices 1-2 summarize the demand forecast for coal through 2020. Through 2012, coal demand will experience modest growth due to the addition of coal-fired electrical generating capacity. According to the National Energy Technology Laboratory (NETL), four coal-fired power plants with capacity totaling 1,442 MW have become operational in the 2nd quarter of 2009. Twenty-three (23) more plants are being built with the total capacity 14,622 mW and are expected to come online before 2012. However, because no new coal-fired generation stations are currently expected in years beyond 2012, the overall market, by volume, is expected to flatten off at that time. Further impacting coal producers, prices are expected to be weak due to strong competition in the power generation market from natural gas. Average coal prices are expected to fall from their 2009 peaks of \$37.43 per short ton to \$32.37 in 2010, rising by 1.6% per year from there. Revenues to coal producers are expected to fall from nearly \$26 billion in 2008 to just over \$22 billion in 2010. Revenue growth is expected to average just 1.8% per year to 2020, with industry wide revenue finally eclipsing expected 2009 levels in 2017.

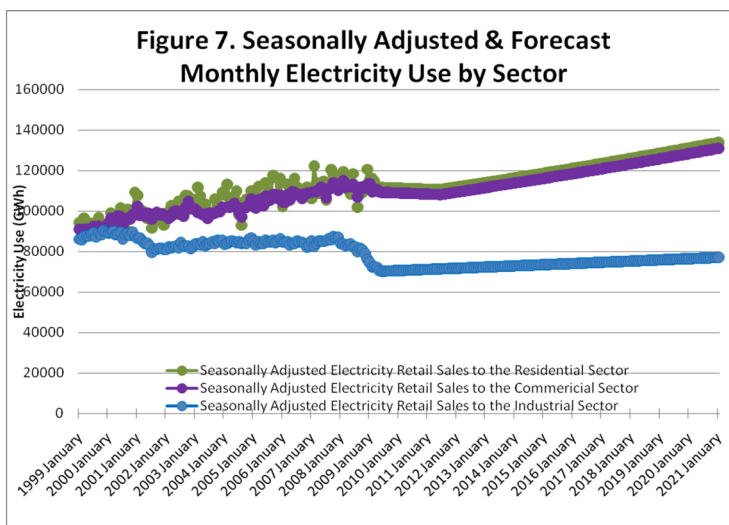
Power Generation Sector

The entire Power Generation market is broken down into three components: electricity delivered to residential consumers, commercial consumers, and industrial consumers. Figure 7 illustrates the seasonally adjusted demand of each sector. While the industrial sector has experienced significant contraction, both commercial and residential have traditionally grown very steadily.

From 1999 to 2007, growth in both commercial and residential consumption averaged 2.3% per year. However, due to high energy prices, demand leveled off as consumers sought out methods of conservation. In fact, from 2007 to 2009, demand declined an average of 0.5% per month. A focus on conservation is expected to continue for the next two years. However, as the simple conservation

measures are exhausted, demand will again be driven by traditional drivers such as population growth and economic expansion. Additionally, plug-in hybrid electric vehicles (PHEV) are expected to hit the consumer market in late 2010 and will provide a modest increase in demand. From 2009-2011, demand in these sectors will decline an average of 0.5% per year, returning to a growth rate of 2% in 2012. In 2011, the emergence of PHEVs is estimated to increase demand by 9.3 GWh with this demand growing to over 5000 GWh (0.13%) by 2020.

The industrial segment has experienced a permanent contraction in demand in each of the last two recessions. Between the recession of 2000-2001 and that of 2008-2009, demand grew by an average of 0.8% per year, however, the large losses experienced in 2000-2001 were not recovered and those in 2008-2009 are also expected to be permanent. Based on correlation with the industrial output index, electricity demand in the industrial sector bottomed in June 2009 and is expected to return to modest growth of 0.8% per year. Figure 7 illustrates these projections.



In addition to overall electricity demand, the demand for coal in the power generation market is also affected by the relative pricing of coal and natural gas. As the price of natural gas falls relative to coal, more of the market is supplied by natural gas, as many generators can burn either fuel. By regressing coal generator utilization on the ratio of coal and natural gas prices as well as total demand, the utilization of installed coal generating capacity can be estimated. This analysis is included in Appendix 2. Then, using the utilization factor, based on the predicted coal-to-natural gas price ratio detailed below, and expected generation capacity, the demand for coal is finally forecast. This is summarized in Appendix 1.

Pricing of coal is expected to be sensitive to the price of natural gas. The rapid increase in natural gas prices from 2006-2008 had two effects. First, it allowed coal producers to negotiate a higher price for their product. Second, it spurred development of increased supply in the natural gas market. Due to the increase in supply and the economic contraction of 2008-2009, natural gas prices have dropped by over 50%. This, in turn, has impacted coal demand and as pricing contracts expire, is expected to impact coal prices as well. Based on new natural gas supply, prices have been forecast to rise at a modest rate of 2% per year. Based on historical data depicted earlier in Figure 5, coal is expected to end up being priced at one half the price of natural gas for an equivalent generating capacity. The reversion to this pricing ratio has been assumed to take five years to account for supply contracts and the adaptation of the power generation market. The forecast for coal prices is included in Appendix 2.

Industrial Sector

Coal demand in the industrial sector is expected to remain roughly flat, declining by 0.7% per year from 2010 to 2020. This sector has experienced a prolonged contraction, falling by -0.7% per year from 2002 to 2007 and there is no reason to believe the trend will be broken.

Residential Sector & Exports

Both the residential sector and net Exports are expected to remain flat. Neither account for a large fraction of the market and historical evidence suggests there is no reason to believe either sector will experience much growth.

Valuation Analysis

Summary

To value the coal industry, a discounted cash flow analysis was performed for ten of the top US coal producers. Appendices 3-4 summarize this analysis. Having estimated the WACC for the industry at 12.44%, free cash flows were projected to 2020 as well as a terminal value. The discounted value of these cash flows was found to be \$21.8 billion. After subtracting net debt, equity value was determined to be \$16.8 billion. The market cap for the same ten producers is currently \$36.4 billion. This indicates a 117% overpricing by the market and leads to an underweight recommendation. The source of this mispricing is a mildly optimistic view of coal demand and an overly optimistic view of coal prices supported by unsustainable record high prices that were contracted with utilities when natural gas prices were over 100% higher than current levels.

Revenue Growth: Revenue growth was modeled by forecasting end-use demand in each major sector of the coal market as well as price. Coal prices were forecast assuming that natural gas, serving as a substitute for coal in the power generation sector, will exert strong downward pricing pressure on coal producers.

Cost-of-Goods Sold: COGS was modeled by examining historical data for margins versus coal prices. Over the last four years, coal producers have enjoyed expanding margins as coal prices have risen 32%. However, it is expected that falling prices will compress gross margins from their current high of 28% to 23% in 2010, with margins remaining low for the remainder of the decade.

Selling General & Administrative: SG&A was forecast by averaging SG&A as a percentage of sales for the prior four years and then projecting this rate into the future. As a percent of Sales, SG&A was found to be fairly stable at 3.95%.

Depreciation & Amortization: D&A was forecast as a percentage of Gross PPE, which was forecast as a percentage of coal production (volume). D&A was forecast as 4.55% of Gross PPE which was forecast as 3.81% of volume production.

Tax Rate: The marginal tax rate was assumed to be 35%.

Change in Working Capital: Working capital (Receivables, Inventory, Pre-paid Expenses, Payables, Accrued Expenses) was forecast by averaging it as a percent of sales for the past four years and projecting this value forward. As a percent of sales, working capital was forecast to be 0.79%. The change in working capital was then computed as the difference in working capital from year to year.

Capital Expenditures: Capex was forecast using Gross PP&E and Depreciation. Capex was assumed to account for Depreciation (replacement of equipment depreciated/used) plus the change in Gross PP&E.

Terminal Growth Rate: The terminal growth rate of free-cash flows was forecast to be 2%. This is primarily driven by inflation price growth of 2% as demand is forecast to be nearly flat beyond 2020.

A projected Balance Sheet is included as Appendix 5.

Risks to This Valuation

In valuing the US coal mining industry, several assumptions have been made which have a significant impact on the valuation analysis.

- Coal prices have been pegged to Natural Gas prices in a long-term ratio of 2:1 (natural gas – to – coal) in terms of electricity production per unit. To the extent coal producers are able to exert pricing power, the analysis will undervalue coal receipts to the miner. Since utilities consume 93% of all coal produced and have a ready substitute in natural gas, this risk has been judged to be minimal.
- Natural gas prices were estimated to grow at 2% per year for the next decade. Owing to substantial increases in supply, high prices experienced in 2005-2008 are believed to be unwarranted. However, if supply is disrupted or natural gas demand growth outstrips supply, this assumption may prove to be flawed.
- Construction of new coal-fired power plants is assumed to cease in 2012. Currently, the EIA has no data indicating construction beyond 2012 has been approved. Furthermore, anecdotal evidence indicates that permits for new plants have been stalled. If this assumption turns out to be false, power generators may consume more coal, increasing revenues to producers.
- The cost of capital has been calculated using a historically low risk-free rate. Should this rate rise, which is believed to be likely, the discounted value of future cash flows will correspondingly fall, further reducing the valuation.

Discrepancy between our Valuation and the Market Valuation

- Our analysis values the index of coal miners at \$17.04 billion versus a market valuation of \$36.4 billion.
- Our coal price forecast incorporates data about the historic price relationship between natural gas and coal, relative to each fuel's thermal content and the recent drop in natural gas prices. We believe that the market has ignored the historical relationship and is also expecting a quick rebound in natural gas prices to the highs experienced from 2005-2008. Our valuation rises by \$7.3 billion or 43% if a 2% annual coal price increase is forecast for 2010 and subsequent years.
- Our valuation, based on a forecasted drop in coal prices, predicts a drop in miner gross margins of 1.6% between 2008 and 2010 that is not recovered until 2019. If we further modify our valuation to assume the gross margin remains constant at 2008 levels (28.7%), our valuation rises by another \$1.2 billion.
- Our valuation applied a discount rate, or weighted-averaged cost of capital, of 12.44%. If this is reduced by 1%, a further \$3.5 billion is added to the valuation.
- We forecast a terminal growth rate of 2%, in line with our expectation of flat demand and 2% price appreciation. If this growth rate is increased to 3% (after applying the modifications for price, margin, and WACC), which factors in historical demand growth of 1%, the terminal value rises \$1.4 billion.
- Applying these adjustments which could be reasonable assumptions of the market based on historical data, our DCF valuation is \$30.44 billion. This implies a market price of 1.195 times intrinsic value, still indicating a strong sell.

Appendix 1. Coal Demand Forecast																
	2005	2006	2007	2008	2009E	2010E	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Electricity Demand (Total GWh)	4,055,423	4,064,702	4,156,745	4,110,259	3,940,574	3,904,179	3,907,720	3,967,139	4,035,371	4,104,584	4,175,083	4,246,893	4,320,854	4,396,178	4,472,890	4,551,018
Electricity Demand Growth (yoy %)		0.23%	2.26%	-1.12%	-4.13%	-0.92%	0.09%	1.52%	1.72%	1.72%	1.72%	1.72%	1.74%	1.74%	1.74%	1.75%
Coal Generating Share	49.63%	48.97%	48.51%	48.52%	47.16%	48.95%	49.58%	49.79%	48.97%	48.16%	47.37%	46.55%	45.73%	44.93%	44.14%	43.37%
Coal Generating Capacity (MW)	333,174	333,770	335,284	336,291	342,373	347,369	351,883	358,507	358,507	358,507	358,507	358,507	358,507	358,507	358,507	358,507
Coal Utilization	68.97%	68.08%	68.65%	67.70%	61.97%	62.81%	62.86%	62.89%	62.92%	62.94%	62.97%	62.95%	62.92%	62.90%	62.87%	62.84%
Coal Fueled Electricity (GWh)	2,012,873	1,990,511	2,016,456	1,994,385	1,858,462	1,911,271	1,937,635	1,975,065	1,975,925	1,976,775	1,977,611	1,976,839	1,976,043	1,975,233	1,974,408	1,973,568
Coal conversion (GWh / billion Btu)	0.0956	0.0960	0.0960	0.0961	0.0949	0.0949	0.0949	0.0949	0.0949	0.0949	0.0949	0.0949	0.0949	0.0949	0.0949	0.0949
Coal conversion (B Btu / 1000 ST)	20.2140	20.1262	20.0560	19.8868	19.8868	19.9045	19.9045	19.9045	19.9045	19.9045	19.9045	19.9045	19.9045	19.9045	19.9045	19.9045
Coal Consumption Power Gen (1000 ST)	1,041,448	1,030,556	1,046,795	1,043,589	984,329	1,011,398	1,025,349	1,045,156	1,045,611	1,046,061	1,046,503	1,046,095	1,045,674	1,045,245	1,044,808	1,044,364
Coal Price (\$/million Btu)	1.54	1.69	1.77	2.07	2.25	1.95	1.97	2.00	2.02	2.05	2.07	2.11	2.15	2.20	2.24	2.29
Coal Price (\$/ST, at dest)	31.13	34.01	35.50	41.17	44.75	38.81	39.28	39.74	40.22	40.71	41.20	42.03	42.87	43.72	44.60	45.49
Delivery Cost (%)	0.24	0.26	0.26	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Coal Price (\$/ST, at mine)	23.66	25.17	26.27	32.52	35.35	30.66	31.03	31.40	31.78	32.16	32.55	33.20	33.86	34.54	35.23	35.94
Coal Revenue (Electricity Gen, \$B)	24.64	25.94	27.50	33.94	34.79	31.01	31.81	32.82	33.22	33.64	34.06	34.73	35.41	36.10	36.81	37.53
Coal Consumption Industrial (1000 ST)	83773.9	82429.2	79330.6	76605.7	60703.2	58605.8	58195.5	57788.2	57383.6	56982.0	56583.1	56187.0	55793.7	55403.1	55015.3	54630.2
Coal Price (\$/ST)	47.63	51.67	54.42	62.98	68.46	59.39	60.09	60.81	61.54	62.28	63.04	64.30	65.59	66.90	68.24	69.60
Coal Revenue (Industrial Use, \$B)	3.99	4.26	4.32	4.82	4.16	3.48	3.50	3.51	3.53	3.55	3.57	3.61	3.66	3.71	3.75	3.80
Coal Consumption Residential (1000 ST)	377.5	290.4	352.6	350.6	327.1	305.2	284.7	265.7	247.9	231.2	215.8	201.3	187.8	175.2	163.5	152.5
Coal Price (\$/ST)	84.05	92.97	94.97	111.15	120.81	104.80	106.04	107.31	108.60	109.91	111.25	113.47	115.74	118.05	120.42	122.82
Coal Revenue (Residential Use, \$B)	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
Coal Net Exports	20000	20000	22900	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Coal Price (\$/ST)	31.13	34.01	35.50	41.17	44.75	38.81	39.28	39.74	40.22	40.71	41.20	42.03	42.87	43.72	44.60	45.49
Coal Revenue (Exports, \$B)	0.62	0.68	0.81	0.82	0.89	0.78	0.79	0.79	0.80	0.81	0.82	0.84	0.86	0.87	0.89	0.91
Total Coal Production (1000 ST)	1,145,599	1,133,276	1,149,378	1,140,545	1,065,359	1,090,309	1,103,829	1,123,210	1,123,243	1,123,274	1,123,302	1,122,483	1,121,655	1,120,823	1,119,987	1,119,146
Total Coal Revenue (\$B)	29.28	30.91	32.66	39.63	39.88	35.30	36.13	37.15	37.59	38.03	38.48	39.21	39.95	40.71	41.48	42.26
Total Coal Demand Growth (yoy %)		-1.08%	1.42%	-0.77%	-6.59%	2.34%	1.24%	1.76%	0.00%	0.00%	0.00%	-0.07%	-0.07%	-0.07%	-0.07%	-0.08%
Total Coal Revenue Growth (yoy %)		5.54%	5.69%	21.32%	0.65%	-11.49%	2.34%	2.84%	1.17%	1.17%	1.18%	1.89%	1.89%	1.89%	1.89%	1.89%
Top 10 Coal Mining Revenue (62.5%)	17.6	19.2	19.8	25.925	24.93	22.06	22.58	23.22	23.49	23.77	24.05	24.50	24.97	25.44	25.92	26.41
Coal Price per Short Ton (\$/st)	25.56	27.27	28.42	34.74	37.44	32.38	32.73	33.08	33.46	33.86	34.25	34.93	35.62	36.32	37.03	37.76
sources: EIA, Electric Power Annual 2008, Report No.: DOE/EIA-0226 (2009/09)																

Appendix 2. Coal Pricing Forecast															
Historical Data							Forecast Data								
	Year	Coal Util	NG/Coal Price	Total Elec Demand	Total Coal Cap	Generation / Consumption (Loss)				Coal Price (\$/Mbtu)	NG Price (\$/Mbtu)	NG/C Ratio	Espected Electricity Demand	Predicted Coal Utilization	
	2009	0.573673	1.636534	3940000	342373				2009	2.2	4.9	1.67	3,940,574	61.97%	
	2008	0.677002	3.384335	4110259	336290.8	1.119238981			2010	1.95	5	1.92	3,904,179	62.81%	
	2007	0.68655	3.133645	4156745	335283.8	1.119155314			2011	1.97	5.10	1.94	3,907,720	62.86%	
	2006	0.680789	3.20335	4064702	333770.3	1.123656643			2012	2.00	5.20	1.95	3,967,139	62.89%	
	2005	0.68967	4.158124	4055423	333173.7	1.124401798			2013	2.02	5.31	1.97	4,035,371	62.92%	
	2004	0.678741	3.461582	3970555	332724.2				2014	2.05	5.41	1.98	4,104,584	62.94%	
	2003	0.678466	3.596678	3883185	332091.2				2015	2.07	5.52	2.00	4,175,083	62.97%	
	2002	0.664683	2.492017	3858452	332003.2				2016	2.11	5.63	2.00	4,246,893	62.95%	
	2001	0.654673	3.345058	3736644	331992.7				2017	2.15	5.74	2.00	4,320,854	62.92%	
	2000	0.677158	3.379851	3802105	331473				2018	2.20	5.86	2.00	4,396,178	62.90%	
	1999	0.648079	2.00009	3694810	331342.5				2019	2.24	5.98	2.00	4,472,890	62.87%	
	1998	0.646116	1.798297	3620295	331011.1				2020	2.29	6.09	2.00	4,551,018	62.84%	
	1997	0.636288	2.031704	3492172	331011.1										
	1996	0.61929	1.90163	3444188	330912.7										

Appendix 3. Calculation of Discount Rate		
		Comment
<u>Calculation of Re using CAPM</u>		
Rf=	3.32	10-year US Treasury yield %. Source: WSJ
Levered average industry beta	1.46	Average betas of top 10 coal companies
MRP	7.2	Source: Koller, Tim, Mark Goedhart and David Wessels, Valuation: Measuring and Managing the Value of Companies, 2005, 4th edition.
Re=	13.83	
<u>Calculation of Rdebt using CAPM</u>		
Debt rating:		
Alliance Holdings GP	BB	2008 10-k report
Alpha Natural Resources, Inc.		
Arch Coal Inc.	BB	2008 10-k report
CONSOL Energy Inc.	BB+	2008 10-k report
Foundation Coal Holdings Inc.		
Massey Energy Co.	BB-	2008 10-k report
Natural Resource Partners LP		
Patriot Coal Corporation		
Peabody Energy Corp.	BB	2008 10-k report
Walter Energy, Inc.		
Average rating:	BB	
Yield spread over government bonds	2.7	Source: Altman, Measuring corporate bond mortality and performance, Journal of Finance, 1989.
Resulting cost of debt	6.02	=Risk-free rate+Rating-dependent yield spread
<u>Calculation of WACC</u>		
Industry Debt/EV	0.179	Weighted average of Debt/Industry EV, 2009
Industry Equity/EV	0.821	
WACC	12.44	

Appendix 4. DCF for Top 10 U.S.Coal Producers																	
In Millions USD, except per share items.																	
For the Fiscal Period	2005	2006	2007	2008	2009E	2010E	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2020
Total Revenue	17,600	19,200	19,800	25,925	24,928	22,063	22,579	23,221	23,492	23,768	24,049	24,504	24,969	25,441	25,923	26,414	
Cost Of Goods Sold	13,678	14,415	15,199	18,486	17,364	16,099	16,423	16,837	16,974	17,113	17,252	17,471	17,690	17,908	18,126	18,343	
Gross Profit	3,913	4,631	4,500	7,317	7,477	5,965	6,156	6,384	6,518	6,655	6,797	7,033	7,279	7,533	7,797	8,071	
Selling General & Admin Exp.	789	718	807	910	889	871	892	917	928	939	950	968	986	1,005	1,024	1,043	
Depreciation & Amort.	1,275	1,265	1,439	1,681	1,846	1,889	1,913	1,946	1,946	1,946	1,946	1,945	1,944	1,942	1,941	1,939	
Operating Income (EBIT)	1,749	2,648	2,254	4,726	4,742	3,204	3,351	3,520	3,643	3,770	3,900	4,120	4,349	4,586	4,833	5,088	
NOPLAT	1,137	1,721	1,465	3,072	3,082	2,082	2,178	2,288	2,368	2,451	2,535	2,678	2,827	2,981	3,141	3,307	
Depreciation & Amort. PP&A	1,275	1,265	1,439	1,681	1,846	1,889	1,913	1,946	1,946	1,946	1,946	1,945	1,944	1,942	1,941	1,939	
Change in NWC	3,285	(2,818)	(22)	(429)	719	(311)	4	5	2	2	2	4	4	4	4	4	
Capex (Net)	2,160	2,934	2,545	3,374	3,153	2838	2428	2685	1948	1948	1948	1914	1912	1911	1909	1907	TV
FCF	(3,033)	2,870	381	1,808	1,057	1,444	1,659	1,545	2,365	2,447	2,532	2,706	2,854	3,009	3,169	3,335	32,598
WACC	12.44%																
DCF	22,014					1,285	1,312	1,087	1,480	1,362	1,253	1,191	1,118	1,048	981	919	8,979
Net Debt (Debt - Cash - STLT Inv)	4,971																
Equity value	17,043																
Market cap, top 10 index	36,436	114%	overpriced														

Appendix 5. Projected Industry Balance Sheet																	
	2005	2006	2007	2008	2009E	2010E	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E	
Assets																	
Cash + ST	1680	1090	658	2481	2279	1529	1564	1609	1628	1647	1666	1698	1730	1763	1796	1830	
Receivables	1588	1817	1585	1999	1653	1800	1734	1900	1776	1943	1820	2014	1893	2088	1968	2165	
Inventory	1346	947	1058	1314	1710	772	1768	844	1798	875	1830	926	1882	979	1936	1034	
Other Current Assets	5584	2934	3319	3468	1385	2811	2877	2959	2994	3029	3064	3123	3182	3242	3303	3366	
Total Current Assets	10198	6788	6621	9261	7025	6911	7943	7312	8195	7494	8380	7761	8686	8072	9003	8396	
Gross PPE	24383	29701	33041	38678	40587	41,538	42,053	42,791	42,792	42,794	42,795	42,763	42,732	42,700	42,668	42,636	
Acc Dep	(9407)	(10583)	(11713)	(13447)	(14766)	(16,655)	(18,568)	(20,514)	(22,460)	(24,407)	(26,353)	(28,298)	(30,242)	(32,184)	(34,125)	(36,064)	
Net PPE	14976	19118	21327	25230	25822	24883	23485	22277	20332	18387	16441	14465	12490	10516	8543	6572	
Long Term Investments	240	301	578	412	678	678	678	678	678	678	678	678	678	678	678	678	
Other Long Term Assets	3315	3571	2348	2682	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	
Total Assets	28729	29778	30874	37585	35865	34812	34445	32606	31545	28898	27839	25243	24194	21606	20564	17985	
Liabilities																	
Accounts Payable	1256	1204	1257	1738	1733	1474	1509	1552	1570	1588	1607	1638	1669	1700	1732	1765	
Accrued Expenses	1753	1622	1665	1964	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	
Other Current Liabilities	710	1011	1518	2494	1834	1498	1533	1576	1595	1614	1633	1664	1695	1727	1760	1793	
Total Current Liabilities	3719	3837	4440	6196	5149	4555	4624	4711	4747	4784	4822	4883	4946	5010	5075	5141	
Long Term Debt	7745	9495	9326	9919	7927	7927	7927	7927	7927	7927	7927	7927	7927	7927	7927	7927	
Capital Leases	0	102	92	76	70	70	70	70	70	70	70	70	70	70	70	70	
Minority Interest	62	207	221	268	316	316	316	316	316	316	316	316	316	316	316	316	
Other Non-current Liabilities	10906	10045	8814	10619	10661	10661	10661	10661	10661	10661	10661	10661	10661	10661	10661	10661	
Total Libilities	22432	23687	22892	27077	24123	23528	23598	23684	23721	23758	23796	23857	23920	23983	24048	24114	
Preferred Stock	0	12	14	15	14	14	14	14	14	14	14	14	14	14	14	14	
Shareholder Equity	6297	6078	7968	10492	11727	11269	10834	8908	7810	5126	4029	1372	260	-2392	-3498	-6143	
Total Liabilities + Equity	28729	29778	30874	37585	35865	34812	34445	32606	31545	28898	27839	25243	24194	21606	20564	17985	
Forecasting Assumptions																	
Total Coal Revenue (\$ billion)	17.60	19.20	19.80	25.93	24.93	22.06	22.58	23.22	23.49	23.7							

source: CapitalIQ

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