

Coal Goes On Steel Wheels Tour

The apparently simple question of which energy source competes in which market(s) with which other energy source(s) creates a constant confusion (see *The Spread That Isn't*, April 2010). The simple fact is energy sources do not compete solely at the burner-tip; they compete every step of the way from origin to the burner tip. This means we have to account for internalized environmental costs, embedded options on delivery interruption, storage considerations, pipeline networks, the availability of retail outlets and, most amazing of all, whether the fuel in question has the natural convenience of being a liquid. This last point often is overlooked in any discussion of petroleum markets; as liquids flow under their own pressure and do not require pressurized storage, they can be used in ways solids and gases cannot.

A second point of competition is those unique points about any fuel or market that may look like “inside baseball” to those not in the industry but are critical nevertheless. Good cases in point here are the refining differences between heavy and light and sweet and sour crude oils. A second one, and related to the present discussion, is the distinction between steam and metallurgical coal. While steam coal is used primarily to generate electricity and thus competes with everything from natural gas to hydroelectric to nuclear, metallurgical coal is used to smelt ores and produce the coke needed to reduce the metals. This segment of the coal market is somewhat protected from competition in the way aluminum is protected from competition with other metals in the manufacture of aircraft on weight considerations and from competition by composites on cost considerations.

In addition, there is no national coal market, so the term “coal prices” is not particularly meaningful. While both the petroleum and natural gas markets are linked with a maze of pipelines, most of which only move in one direction, coal is a series of separate production markets, the largest two of which are the Powder River Basin in Wyoming and Montana and the Central Appalachian market, primarily in West Virginia and Kentucky (the Big Sandy River, referred to several times below, defines part of the border between the two states). The two regions’ prices behave differently.

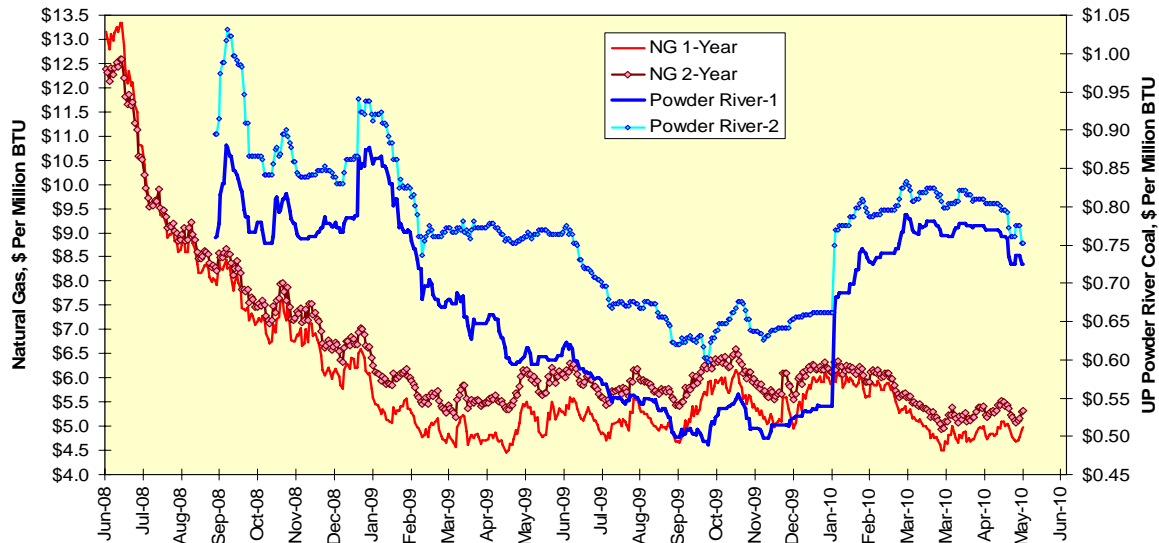
Finally, as coal is dependent on rail transport out of many producing regions and to export terminals, railroads such as Union Pacific and CSX provide many of the quotes used in coal markets.

Coal And Natural Gas

Natural gas prices should not be viewed solely in terms of the front-month but rather as a strip of prices. This both smoothes out the seasonality in the market and allows us to match a forward price in a commodity with the forward-looking equity market. In addition, we should remain mindful that while natural gas trades daily rather actively, most coal is bought and sold on long-term contracts. The two markets have a bit of a tortoise-and-hare relationship.

If we compare the one- and two-year Union Pacific strip prices from the Powder River Basin against similar prices for natural gas in Chart 1, we do not see a significant correlation between the two over the short period of time when the coal strip prices have been available. Not only had second-year Powder River coal been particularly slow in converging downward in competition with second-year natural gas strips, but the enormous effect of new contracts started in January is strikingly visible.

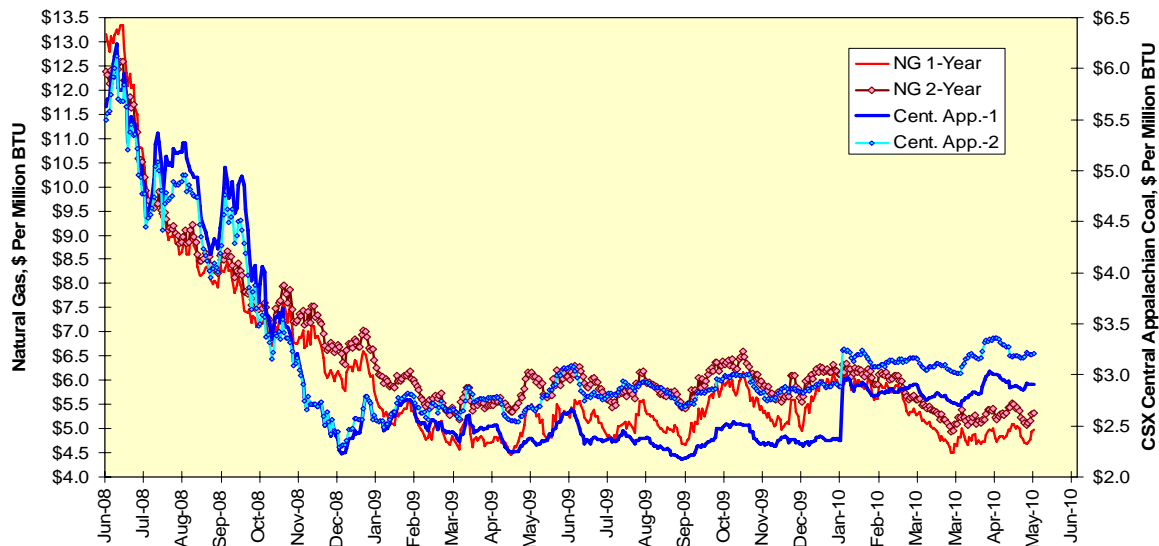
Chart 1: Comparative Forward Prices: Natural Gas Vs. Powder River Coal



It is important to note as well the large ordinal difference between natural gas prices and coal prices. Coal prices are much lower over time on a BTU basis because coal is so much more expensive to transport, burn and manage. Once you burn coal, you are left with waste products such as fly ash. While this can be converted into a substitute for Portland cement, it is largely a solid waste management problem. In addition, coal’s exhaust gases have to be scrubbed of sulfur oxides, and this leads to another solid waste problem at the baghouse level. Finally, the question of carbon dioxide looms large (see *Interference! Why the Government Should Stay Out of the Markets*, November 2009). While natural gas produces carbon dioxide during combustion, it is far cleaner to burn that coal and therefore can command a higher price.

If we shift the analysis to CSX’ Central Appalachian strips; we can see a much tighter correlation in Chart 2, the January effect of new contracts notwithstanding. The Central Appalachian market relies more on deep-shaft as opposed to surface mining; these mines and the barge transport system in the eastern United States allow for much more flexible production shut-downs and re-starts than can exist in the Powder River surface mines wholly dependent on rail transport. A forward-looking competition between this source of coal and natural gas is more meaningful.

Chart 2: Comparative Forward Prices: Natural Gas Vs. Central Appalachian Coal

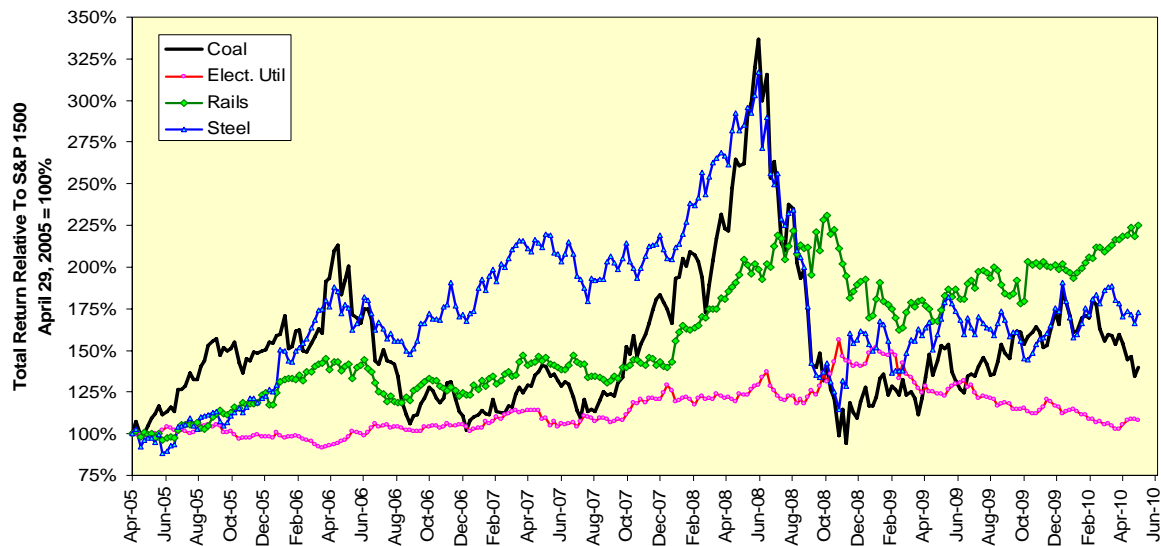


Coal-Linked Equities

Just as natural gas has to be viewed from both the consuming industries’ perspective as well as from the producing and transport industries, coal must be viewed this way as well. Let’s look in Chart 3 at four industries with strong

links to coal, coal itself, electric utilities, railroads and steel and track their total returns relative to the S&P 1500 Supercomposite back to the end of April 2005.

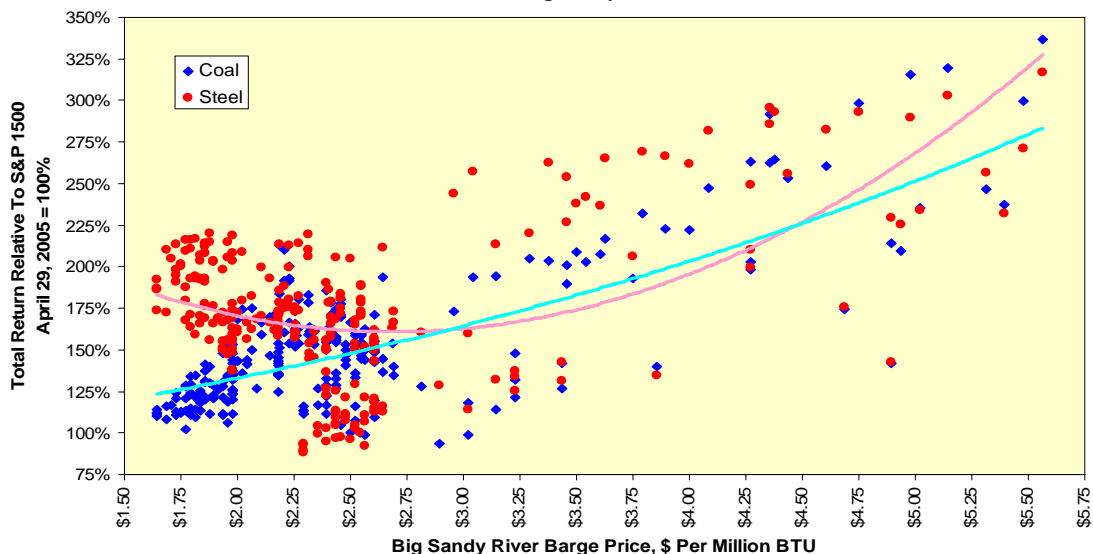
Chart 3: Relative Performance Of Coal-Linked Industries



Two groups, coal and steel, rose together going into coal's 2008 peak and fell together as the market broke during the financial crisis and ensuing recession. Interestingly, neither the rail nor electric utility groups were as linked to coal prices over time. For the record, the coal group consists of Arch Coal, Consol Energy, Massey Energy, Patriot Coal and Peabody Energy. The steel group consists of AK Steel, Allegheny Technologies, AM Castle, Carpenter Technology, Cliffs Natural Resources, Commercial Metals, Nucor, Olympic Steel, Reliance Steel, Steel Dynamics, U.S. Steel and Worthington Industries.

As it turns out, the relative total returns depicted in Chart 4 for the steel group has a quadratic relationship against the Big Sandy River barge price, while the coal group has only a linear relationship. This tells us incremental demand from the global steel industry is a far more important contributor to the coal industry's well-being than is the more prosaic steam coal. The global steel boom created a demand for the more expensive grades of metallurgical coal; we can state the strong performance for the steel group came as its demand growth allowed it to absorb higher metallurgical coal prices. The coal group has no such value-added relationship to the price of coal itself, as odd as this may seem.

**Chart 4: Relative Industry Performance As Function Of Coal Price:
Big Sandy River**



However, this misdirected link is not that unusual. Natural gas is dependent on the petrochemical and fertilizer industries as well as on the space-heating and power-generating industries. As expensive as it may be to strip the

hydrogen off of methane to make ammonia, no reasonable substitute has been developed to-date. The same holds true for coal-derived coke; while petroleum-derived coke is a viable substitute for coal coke in areas where refineries are near steel mills, this coke tends to be used as a smelting fuel due to its higher sulfur content.

What all of this tells us is natural gas traders have to keep one eye on the coal market; an increase in steel-derived coal demand will provide a higher ceiling for natural gas prices even though the direct link between steel manufacture and natural gas use is weak. It also tells us coal as a fuel and the stocks of coal producers will remain viable until and unless world steelmaking demand collapses.