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Is Lurgi really KFx's savior or is it just smoke and mirrors?

How does a penny-stock that went public through a reverse merger with a \$10,000 shell company overcome a long history of questionable dealings and turn a 30 plus year failed energy scheme into a billion dollar bonanza? By involving the best name in an esoteric segment energy business and appearing to be poised to revolutionize an \$8 billion industry. Could it all be real? Well real enough for some of Wall Street's biggest hedge-funds (people who are supposed to know how to spot a scam) to think that they can join the band wagon and get away with it.

According to the Bureau of Land Management ("BLM") in 2004, approximately 381.6 million tons of coal were mined from Wyoming's Powder River Basin ("PRB") region, which equaled over 30% of total U.S. coal production.¹ On a typical day 9,000 railroad cars loaded with 115 tons of PRB coal are hauled out of Wyoming on 67 one-mile-long trains. The trains are bound for utility plants where the coal is burnt in boilers that generate over 15% of the electricity used in the U.S.

The BLM estimates that in 2004 \$4.5 billion was spent transporting PRB coal to users. Unfortunately, PRB coal has high moisture content. ² So with those 381.6 million tons of PRB coal, went hundreds of millions tons of water, that if removed before shipping, could theoretically save PRB users in excess of a billion dollars a year in transportation costs.

PRB coal's high water content engenders two other significant costs. First, energy that could otherwise be used to produce electricity must be consumed to convert all that water to steam at the time the coal is burnt in the plant. Second, the sheer volume that the water occupies in the utility's boilers "de-rates" the plant, meaning it reduces this and the generating capacity of power stations that use PRB coal. Since PRB coal has so much water per ton of coal, even after it's milled and ready to burn, and since the plants' boilers are capable of burning only so much coal per hour, the same plant burning PRB coal generates less electricity than it would burning coals with less water.

Eliminating the water and thereby in theory eliminating its transport cost and lost power generation obviously has the appearance of being an interesting and feasible proposition. One would think that after over 30 years of successful and growing PRB operations³ that there must have been many attempts to de-water PRB before it's shipped. In fact, there have been many costly attempts by both small technology firms and large industrial companies, some with government funding, that have used all sorts of processes to de-water PRB.

For example, various techniques employed to attempt to de-water PRB have included fluid beds where the coal is pushed along over streams of hot air; staged vibrating fluid beds where the coal rests momentarily on a screen and is shaken to remove contaminants; rotary or spiral grate dryers where the coal is dropped into a rotating chute that uses air or steam to dry the coal; hot oil or "French frying" coal; hydrothermal drying using pressurized steam vessels; and other processes that make briquettes from dried PRB both with and without using binder materials.

These processes have been extensively tested in labs, and in pilot and demonstration plants. The U.S. Department of Energy alone spent \$88.4 million on just two recent (Western SynCoal and Encoal) PRB drying projects. In several cases attempts to build commercial PRB drying plants have also been made. All of them have failed to overcome the

low density, dustiness, degradation and instability (combustion) problems that are inherent to dried PRB coal.

Among the commercial plants that have failed is one by KFx, Inc. (AMEX: KFX, \$15.52) The KFx plant cost \$68 million and actually exploded after becoming engulfed with flames in 1996, and was ultimately shut down for good in 1999. This has not been KFx's only failure. Over the last 20 years KFx has been involved in at least 15 schemes to commercialize its so-called technology. Now KFx is building a new PRB coal drying plant in Gillette, Wyoming, in the same location where its first plant failed. This time, KFx says, with the help of Sasol-Lurgi's 70 plus years of experience in coal processing, it will work. Unfortunately, the South African-based Lurgi's experience is with disintegrating and dissolving coal, not in producing solid fuels. Lurgi's equipment is extremely expensive and is not intended, and has never been used, to de-water coal. Lurgi's equipment is used to convert coal into gas, at an extremely high temperature and with an expensive batch process that is completely opposite KFx's objectives. KFx is attempting to cheaply de-water PRB at a low temperature, without creating dust. Lurgi turns coal in to dust.

KFx is an American Stock Exchange-traded company created through a 1998 reverse merger with a public shell with \$10,000 of capital organized by a Denver Chevrolet car dealer and his receptionist. ⁴ Before its ignoble debut as a public company, KFx's schemes date back to the early 1980s when Ted and John Venners organized Energy Brothers Holding, Inc. and K-Fuel L.P. to commercialize the use of Edward Koppelman's (the "K" in KFx) 1970's, highly experimental process designed to enhance the British thermal unit ("BTU") content of peat, wood and other cellulose materials in coal.⁵ None of Koppelman's ventures succeeded. But KFx, with the help of many a successful stock promotions, has thus far survived.

Since its start as a penny stock, reverse merger, KFx's trading has been characterized by a series of announcements about deals, schemes and stock run-ups, followed by the failure to deliver on promises and inevitable drops. During its entire history KFx has reported losses. But the earlier run-ups pale in comparison to the recent hedge fund led enthusiasm over the promise of its new plant.

KFx is now claiming that its Koppelman process has been improved with help of Lurgi South Africa (Pty) Limited. KFx's new plant uses a modified version of Lurgi's tried and proven Mark IV coal gasification vessel in its process. KFx claims that this new scheme will not only save on transportation cost, but make the coal cleaner burning and therefore more valuable to the utilities industry, must comply with sulfur dioxide and mercury emissions regulations. Plus, KFx adds, its product will qualify for the Internal Revenue Code Section 45 tax credit by the American Jobs Creation Act of 2004 to qualify for a \$5.50 per ton tax credit that it can use or sell. KFx is attempting to cheaply de-water PRB without creating Lurgi without creating Lurgi turns coal to dust.

With a story like that, it is no wonder that reputable hedge funds have led the charge that is responsible for KFx's current run up in stock price. A recent *Wall Street Journal*⁶ article highlighted hedge fund managers, rosy predictions about the company's future. The story also made note of the propensity of these hedge funds to believe KFx's claims, despite KFx's historical inability to produce any evidence of moving closer to producing high grade, de-watered PRB. In the article, one manager states "They've been at it for years and a lot of people don't believe their story, but we've put the time and effort into it and we think the technology will work."

KFx is engaged in building a non-commercial pilot plant and has not produced a deliverable product at any price or cost. Claiming "a lot of people don't believe" KFx is self-serving for its boisterous promoters. So many established hedge-funds have already predicted its huge success with such vigor, that its market value has risen from well below \$100 million as recently as November of 2002 to approximately \$1.15 billion yesterday. So how can KFx's promoters claim that its story isn't being believed?

KFx's lack of credibility is not caused by the fact that "they've been at it for years" or even that it is the same management team that built the exploding plant and promoted 15 other deals, or even KFx's role in a scandal that led to the downfall of Alaska's Attorney General. Rather, KFx's credibility problem derives from the wealth of practical experience and scientific data that indicate that KFx's Lurgi-based PRB de-watering plant cannot be made to work.

The heart of the issue is not simply whether KFx's plant can use heat and pressure to reduce the water content in PRB coal. Reducing the water content has been done many times by many different processes. Even KFx produced and shipped a train load of dried coal a decade ago. And, the issue is whether any dried-out PRB coal can be transported

more cheaply than PRB, unloaded, moved, stockpiled, placed in silos, milled and burned safely at a power generation plant.

PRB coal is not the same rock-like substance found in the eastern coal mines. PRB coal has pores containing water like a sponge and is softer than eastern coal. PRB coal is already dangerously dusty and in its natural state has a greater propensity for spontaneous combustion than Eastern coal. These dust and fire risks are major problems and create the need for special treatment (spraying with water and fire and dust suppressants) and handling procedures (compacting, pile management and dust control on conveyor belt exchanges and in mills) for the railroad and utilities that handle PRB. In fact, PRB dust is a leading cause of train derailments and increased railroad maintenance cost.

PRB railroads are not weight-constrained. PRB trains pull over 120 cars, each filled with approximately 115 tons of coal. PRB trains are volume constrained. There is only so much room in a railroad car and only so many loaded and unloaded trains can travel back and forth on the track. Each year 25,764 trains each a mile-long come out of Wyoming filled with coal and return empty. KFx's scheme to extract a discount from this complex system with a still yet, non-existing PRB derived product is at best, highly questionable..

In order for KFx's dried PRB product to be successful it not only has to weigh less but must also be denser and must also be at least no dustier and have no greater propensity to self-ignite than traditional PRB coal.⁷ Unfortunately, both empirical evidence and scientific studies have found the exact opposite. Dried PRB coal is not sufficiently denser than PRB coal to materially reduce changing cost. Plus dried PRB is far more dusty and volatile than PRB.

Drying PRB coal is not difficult. In fact, during Wyoming's dry summer months, when temperatures can reach 107 degrees Fahrenheit, PRB producers blast massive quantities of PRB coal and allow it to dry before it is tested for BTU content and shipping. ⁸ Also, PRB is always dried during the milling process right before it is burned at the generation plant. The difficulty occurs when PRB coal is put through a mechanical process and then subjected to high levels of pressure and heat long before it is transported, which is exactly what KFx's idea entails.

Scientists have studied PRB coal's dusting and self-ignition phenomenon. This led to the discovery of the source of PRB's dust and self-combustion problems and published scientific papers on PRB's equilibrium moisture content. When PRB coal's moisture falls below this equilibrium level it reabsorbs moisture from the atmosphere. The re-absorption process creates heat, which causes a chemical reaction that leads to spontaneous combustion. It was also discovered that only 1% to 1.5% of PRB's total moisture content is found on the surface. This surface moisture is the first element of PRB to dry, and therefore the most completely dried during any processing. These discoveries make the combustion and dust problems associated with dried PRB coal perfectly understandable.

The first part of PRB coal that is exposed to the drying element, be it the sun and air, or KFx's high-pressure and high-temperature steam, is its surface. The removal of PRB's surface moisture makes it dustier than its already dusty natural state. PRB dust can cause explosions. ⁷ Equally understandable is that the greater the difference between PRB's equilibrium moisture content and its process-dried state, the greater and faster the rate of re-absorption and therefore the greater the heat created by the re-absorption and the greater the propensity for self-ignition.

Many attempts have been made to address the dried PRB coal's dust and re-absorption problems. None have worked. While PRB's inherent moisture levels can be reduced, pores remain active and able to absorb moisture even after being dried out and subjected to enormous amounts of heat and pressure.

KFx seems aware of these problems. After claiming its product will not need to be coated or subjected to special treatment, a study of KFx's pictures published on the internet, of its plant under construction, shows it has incorporated a coating process and a cooler and blender into its design.

In addition to the standard problems that exist in drying PRB coal: cost, low density, degradation and increase in dust and spontaneous combustion, KFx's mechanical and high pressure steam generated PRB coal processing plant has additional problems unique to its own design. KFx's use of a Lurgi vessel, the principle source of its new found credibility, could actually be its biggest problem and largest competitive disadvantage.

The first Lurgi vessel was constructed in 1927 and has since been installed in 450 plants. Therefore, it's quite understandable that KFx could hold out the Lurgi brand to gain credibility. However, as noted above, the Lurgi vessels uses a super-high temperature batch process to create gas from coal, not solid fuel.

KFx's Lurgi design requires it to mechanically screen its incoming PRB feedstock to remove all particles smaller than 0.25-inches in diameter before the feedstock is placed in the Lurgi vessels. This is necessary to avoid over-drying smaller particles, which may be seen as an admission that the process is fundamentally flawed.

This screen-out in any case, presents several problems. Between 25% and 35% of PRB coal is less than 0.25-inches in diameter. KFx will have to either store or attempt to sell these smaller particles or mix them in with its process dried PRB. Mixing the PRB feedstock fines with the dried PRB would reduce KFx's Btu content, which defeats the entire purpose of the operation. However, most utility coal buyers will not buy screened coal. The American Society of Testing Materials sets the standard for PRB purchase contracts. This standard does not allow fines to be greater than 30% to 35% of a PRB shipment.

KFx investors mention Lurgi's success at the Great Plains Synfuels Plant in Beulah, North Dakota as a leading cause of their belief that KFx's scheme will work. In fact, one thing has absolutely nothing to do with the other. At Great Plains the Lurgi vessels are used to heat a mixture of coal and oxygen to 2,200 degrees Fahrenheit under pressure for 20 minutes in 14 Lurgi Mark IV gasifiers. The result is 6% ash and 94% raw gas. The plant was built in 1984 at a cost of \$2.1 billion. A mere look at the Great Plains and KFx sites should show even the most unsophisticated observer, that any comparison between the two is absurd. A reasonable observer may agree, that KFx's plans to use these highly sophisticated vessels simply to boil the water out of the coal and then take the coal out, is even more absurd.

In short, using Lurgi Mark IV vessels to dry PRB coal is unnecessarily expensive in term of both capital and operations cost, adds to the mechanical degradation problems of processing PRB coal, distributes heating and uses lots and lots of water that needs to be properly disposed. All of this with no known practical advantage to other existing coal drying equipment. Furthermore, the Lurgi system is a batch process. Other less expensive to purchase, install and operate systems are continuous and capable of processing over twice the tonnage per hour at a third of the cost. Despite this, the "Lurgi" name is the center piece of KFx's current stock promotion.

In summary, the case against KFx's use of Lurgi equipment to de-water PRB coal leaves plenty of room for doubt that KFx has no chance to succeed.

Endnotes

1. PRB usage has grown steadily. In 1980 PRB produced 95 million tons of coal and accounted for approximately 11% of U.S. coal production. In the early 1970s PRB consumption was approximately 10 million tons per year.
2. PRB coal has 20 to 30% moisture content while eastern coals can be as low as 15%.
3. PRB's relatively low mining cost, and low sulfur content, have combined to overcome its very high moisture calcium and volatility, dust, degradation, spontaneous combustion problems and its remoteness from major markets.
4. Seymour J. Rubenstein, a partner in Ruwart-Rubenstein Chevrolet of Denver, Colorado and Dana Lynn Weiner, a full time and temporary receptionist in Denver, controlled Beaumont Financial, LTD. on April 7, 1988 when it filed to sell \$60,000 to \$120,000 of its stock to the public at \$0.05 for one share and one warrant. Beaumont acquired K-Fuel and became KFx on December 28, 1992.
5. Peat Oil and Gas Associates, LLP. Prospectus. An Edward Koppelman company.
6. See Wall Street Journal article.
7. Click here for clip of PRB exploding.

8. Coal quality varies greatly even within the same vein. BTU content is recorded at the point of loading at the mine and unloading at the utility. The coal shipment is priced accordingly.

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2. See Energy Glossary by Energy Information Administration http://www.eia.doe.gov/glossary/glossary_main_page.htm

3. See Section 45. Electricity produced from certain renewable resources at http://www4.law.cornell.edu/uscode/html/uscode26/usc_sec_26_00000045----000-.html

4. See the "SEC. 710. EXPANSION OF CREDIT FOR ELECTRICITY PRODUCED FROM CERTAIN RENEWABLE RESOURCES" is on Page 118 STAT. 1552 through page 118 STAT. 1557 and "SEC. 711. CERTAIN BUSINESS RELATED CREDITS ALLOWED AGAINST REGULAR AND MINIMUM TAX" found on page 118 STAT. 1557 through page 118 STAT. 1558 of AMERICAN JOBS CREATION ACT OF 2004 at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_public_laws&docid=f:publ357.108.pdf

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