

Controlling Energy Costs in the Face of Rising Natural Gas Prices

— BY BILL MCPHERSON AND PURNA PAI, PH.D

Recent upward movement in the price of natural gas and other fuels has wreaked havoc with paper mill operating budgets and corporate fuel procurement strategies. Currently, most companies are seeking alternatives to natural gas to lower both price and volatility. Due to the large amount of energy required in a paper mill, the use of a less-expensive source of energy is logical. Comparative studies have indicated that the total cost of solid fuels at the burner tip can be sufficiently lower than the cost of natural gas to justify the investments needed and the increased operating costs.

Over the past eighteen months, the price of natural gas has been highly volatile and moved to the highest sustained prices in history. With prices and futures remaining high through the cool summer, expectations of a return to lower natural gas prices from the 1990's have faded. As a result, paper companies are preparing for a future that experts are forecasting will experience natural gas prices between \$4 and \$6/mmBtu for the foreseeable future.

Through the late 1980's and 1990's, the price of natural gas was relatively inelastic to demand. Seeing this stability, many industrial and manufacturing processes were converted to natural gas to simplify operations and environmental compliance. Recently, as domestic supplies have failed to keep up with demand, the price of natural gas has risen. Higher prices will bring new sources of supply from the north shore of Alaska and will incentivize the development of offshore supplies via Liquid Natural Gas terminals. However, new sources will not significantly lower prices because the higher prices are needed to justify the capital expense and transportation costs of new sources.

In addition to being at historic highs, the price of natural gas is compounded by extreme volatility. This volatility precludes an effective corporate budgeting

process and creates problems for corporate managers subjected to increasing profitability and cash flow scrutiny by Wall Street. Unrealized market expectations for profits and dividends resulting from increased energy costs have frequently driven down share prices.

Natural gas has long been a convenient, readily available, environmentally friendly fuel for both industrial and residential use. Alternative fuels were discarded by many industrial users in the 1950's and 1960's when natural gas availability drove prices down. Then in the 1970's came shortages that drove up the price in the short run, but encouraged greater production and price moderation in the long run.

The current high prices and expected long term upward trends justify a re-evaluation of alternative fuel sources, installing additional environmental controls or new equipment.

Today, companies are faced with a new round of difficult decisions between capital expenditures to facilitate the use of lower cost fuels or the higher operating costs of natural gas and fuel oil. Companies with available funds for new facilities or who find third-party providers to invest in new facilities and equipment will take advantage of opportunities in waste fuels and solid fuels that will yield a long term competitive advantage over their peers.

Paper companies that attempt to avoid risk by procuring their natural gas needs through short term agreements will experience a greater impact on their operating budgets due to the increased natural gas prices and volatility. Companies willing to enter longer term energy procurement agreements will face higher prices in exchange for greater stability in the day-to-day price of natural gas.

Figure 1. Historical Prices of Natural Gas and Petroleum Coke



Sources: New York Mercantile Exchange, PACE Quarterly

Increased attention to the environment over the past 20 years encouraged the usage of natural gas as an environmentally friendly energy source. Environmentalists are continually arguing to convert all energy generation facilities to natural gas to lessen environmental impact from stationary combustion sources. Continued conversion of coal fired utilities to natural gas fired combined cycle gas turbines will raise average electrical power costs and force up the price of natural gas during the summer air conditioning season when power demand is the highest.

The current high prices and expected long term upward trends justify a re-evaluation of alternative fuel sources, installing additional environmental controls or new equipment.

Alternatives to Natural Gas

The most common alternative to natural gas in pulp and paper mills is #6 fuel oil. Generally lower in cost than natural gas, it can provide savings and insulation against short-term fluctuations in natural gas prices if the storage tanks, fuel delivery piping, burners, etc. are in place. If new facilities must be installed to enable the use of fuel oil, the savings will typically not meet current payback criteria. Fuel oil offers savings over natural gas pricing and price volatility is generally reduced by on-site storage of several weeks or months of supply. However, one must note that the price trend for fuel oil typically lags behind that of natural gas, but the prices generally follow each other closely and the storage on site will only provide a temporary cushion against price movements.

Wood waste is environmentally friendlier than fossil fuels, and it is a logical choice for pulp and paper mills to offset natural gas usage. Most mills already have maximized their usage of waste wood as the lowest cost fuel available. Increased wood waste usage is usually limited by the availability of suitable waste in a local area,

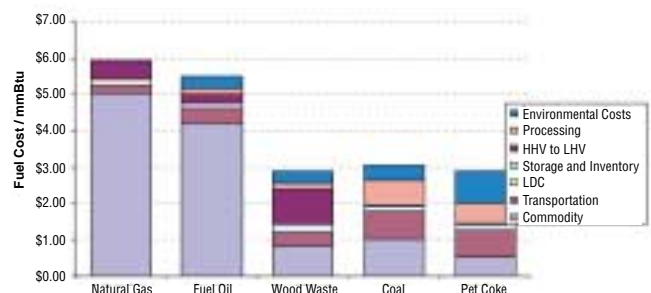
transportation costs, the firing capacity of existing equipment, or by the ash disposal capability of the boiler. High water content and high ash generation limit the effectiveness of wood waste as a substitute fuel. The marginal cost of wood waste in most North American markets is 50 percent to 80 percent of the delivered price of coal. If additional capital expenditures are needed to process the wood waste, increase handling capacity or to remove boiler ash, the costs of wood waste may exceed that of other waste fuels.

Other Solid Fuels

Coal is still used by many companies, but the use of coal for on-site steam production is far less common than it was 30 years ago in large industrial plants. Generally, coal remains the third-largest source of energy for large industrials behind natural gas and fuel oil. Coal has a well developed structure of procurement, transportation, and contracting that simplifies competitive purchasing and reliable delivery. However, coal generally has environmental concerns that will limit its use in many industries and regions despite its price advantage.

Petroleum coke, or pet coke, is not commonly used by the pulp and paper industry today. Inherent characteristics such as high sulfur content, transportation constraints, and heavy metals content have limited the use of pet coke to certain processes or to fuel specific facilities. However, the cost of the raw pet coke only rarely exceeds 65 percent of the cost of coal, allowing large users to recognize additional savings over coal with comparable processing costs. Processing and environmental costs for pet coke often add to the cost such that the difference in burner tip cost of pet coke vs. coal is less than the fuel cost difference. Pet coke is particularly available and low-cost to mills located on major

Figure 2. Comparative Prices of Fuels at the Burner Tip



Source: DTE Energy Services internal estimates

waterways, where it can be transported by barge or freighter.

Many mills use waste-derived fuels in the boilers and kilns as a supplemental fuel. Waste fuel streams vary greatly in composition, price and environmental concerns making generalizations difficult. These fuels are not addressed here because their broad variability and usage is beyond the scope of this discussion.

Logical users of solid fuels

Lower base costs for fuel and economies of scale for fuel handling and environmental controls provide a cost advantage and create an opportunity for very large energy users, such as pulp and paper mills, that can effectively switch to solid fuels.

Solid fuel storage requires a significant area for coal storage and handling. This favors facilities remote from large urban areas where the cost of land is relatively inexpensive and the impact of fugitive dust can be tolerated.

Use of solid fuels will require the installation of environmental controls and monitoring of emissions. Large mill sites, which already employ a staff to maintain and monitor environmental controls, can more easily take on the added maintenance and monitoring requirements of increased control devices.

Alternative supply chains

As large energy users embrace the use of solid fuels, the market will respond with many new packaged solutions that include procurement, transportation, storage, and processing of solid fuels similar to the natural gas industry today. Just as most customers do not buy directly from the gas fields or may contract separately to remove undesirable constituents like sulfur from the raw gas, coal and pet coke suppliers will simplify the procurement and delivery to the customer.

Transportation, storage and balancing are usually bundled by the local distribution company (LDC) or by the pipeline for their customers. Similar services yielding a solid fuel product delivered at the mill site on an as needed basis that meets a given specification for heating value, sulfur content, etc. will evolve as large users return to the marketplace in search of lower-cost fuels. Third-party providers supplying a number of customers will amortize

costs over a larger production volume and lower the cost per unit of energy to the customer.

Storage problems may be resolved with "just in time" delivery of raw or processed fuels. On-site storage silos, common in all paper mills, will resolve space constraints, material handling, dusting, and weather-related problems that currently complicate the use of solid fuels.

Conclusions

Prices of natural gas are projected to remain high enough to justify the greater effort required to use solid fuels such as coal or petroleum coke. In addition, environmental concerns can generally be addressed through the use of modern controls equipment and collection systems operated by the existing environmental management. Use of solid fuels today is much more reliable and cost-effective with the reliability and efficiency of modern environmental controls.

Energy savings from the use of solid fuels can meet the investment criteria of a three-year or less simple payback for the capital required to install new burners, material handling systems, and environmental controls. Third-party suppliers can process and deliver fuels ready for use, avoiding solid fuel infrastructure cost related to grinding and storage of coal or petroleum coke on site.

Therefore, solid fuels such as coal or pet coke will provide the price stability and lower energy costs needed by the pulp and paper industry. As more paper mills and other large industrials return to solid fuels, suppliers will package, simplify, and coordinate fuel delivery for the specific needs of individual plants, making the switch to solid fuels as efficient and cost-effective as possible. ■

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