ARKANSAS MINING INDUSTRY

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Identify the Numbers

Arkansas's mining industry is a hefty contributor to the Arkansas economy. According to the National Mining Association, the combined direct and indirect economic gain from Arkansas's mining industry is $3.9 billion dollars.

The state of Arkansas is home 189 mining operations which employ 3,670 people directly and another 9,810 people indirectly. Arkansas ranks 29th in the United States in mineral production and 25th in the production of coal. Arkansas ranks first in the US in the production of bromine and silica stone and accounts for more than 1% of all mineral production value. Currently, coal is potentially Arkansas's largest untapped resource. According to the Arkansas Geological Commission, there are more than 10 billion tons of coal and lignite present in the state.

Why is this market sector a good fit for CHP?

The Arkansas mining industry is a large, energy intensive, multi-billion dollar industry which accounts for the employment of a significant portion of Arkansas' working population. Nationwide, the mining industry consumes over 291 trillion btus of energy/yr.

Opportunities for CHP installations exist around mine sites where potential energy sources are often ignored or discarded. Coal bed methane and acid mine drainage are two potential fuel sources that could make CHP systems economically viable. The development of Arkansas's coal-bed methane (CBM) industry began in 2001 and has, thus far, produced approximately 10 billion cubic feet of CBM. CBM rich coal beds are currently distributed amongst 25 developed fuel beds, the largest of which is the Lower Hartstone coal bed. Thirty-eight coal-bed methane wells have been drilled in this area and have produced 4.2 billion cubic feet of coal-bed methane.[iii] At a price of $6.40 per thousand cubic feet (mcf)[i], Arkansas has produced $64 million worth of coal-bed methane since 2001.

What is the market potential for this sector?

The Arkoma Basin, which includes parts of Oklahoma and Arkansas, and the Gulf Coast Coal Basin, which stretches primarily across five southeastern states, including Arkansas, are

estimated to contain 1.8 and 3.4 trillion cubic feet (Tcf) of CBM resources respectively. If just 50% of that amount contained in those regions was recovered, it would have a value of approximately $16.6 billion, of which a significant portion would come from the state of Arkansas.

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In addition to the enormous financial benefits that may be enjoyed from the direct sale of CBM, there are other more indirect benefits that must also be considered. Degasification systems increase methane recovery while at the same time preventing gas from seeping into mine working areas, which improves worker safety, and significantly reduce ventilation costs. The increase in recovery also will significantly reduce methane-related mining delays, resulting in increased coal productivity.

What is CBM?

Coal bed methane is a form of natural gas which is generated by either microbial activity or a thermogenic process in which heat and pressure transform organic matter inside a coal vein. Coal bed methane, or CBM, represents an underdeveloped fuel source. Because of its large internal surface area, coal tends to house between six and seven times more gas than a typical natural gas reservoir.[iii] Coal bed methane is considered to be a high quality fuel due to the ease in which it is collected and the minimal amount of refining necessary for use. Coal deposits are usually saturated with water, in which case the methane becomes trapped by the water pressure. By pumping out this water, the pressure can be reduced which allows the gas to be pumped out separately.[iv]

The United States is estimated to house resources of 700 trillion cubic feet (Tcf), a significant portion of which is located in the Arkansas River Valley area across the states of Arkansas, Kansas, Oklahoma, and Missouri.[v] This is in comparison to its conventional natural gas reserves of 187 trillion cubic feet (Tcf).

Additional Benefits

The environmental effects associated with recovering potential methane emissions can serve as another benefit. According the EPA, many US mines have methane emissions in excess of ten million cubic feet per day (cf/d) (or nearly 3.7 billion cubic feet per year). In this instance,

methane recovery at a mine recovering two billion cubic feet of that total per year would result in emissions reductions in the amount of 890,000 tons of CO2. Mine methane recovery projects may serve as an inexpensive alternative to utilities and others looking to offset their own greenhouse gas emissions.

CBM, as a fuel source, is largely underutilized in the Arkansas and in the United States as a whole. Using CBM as a fuel source offers the greatest potential for CHP applications in the state.

Conclusions

While the mining industry initially seems to be a poor fit for CHP because of its high reliance on diesel fuel and lack of need for recycled heat, there still exists potential for CHP systems that will utilize opportunity fuels to produce electricity for nearby facilities as well as the specific refining facilities themselves. This assessment attempts to evaluate opportunities for CHP in unexplored areas that may serve to lower costs and/or increase energy efficiency for the mining industry in the state of Arkansas.

While CHP may provide a cost-saving, energy-efficient option for the mining industry, change is slow to come due to the capital and energy-intensive nature of the industry. However, the availability of fuel sources in the industry at a relatively low cost is something that will not be ignored much longer. Coal bed Methane represents the most abundant fuel source in the industry and is currently being underutilized and in many cases, completely ignored. The possibilities for heat and electricity production from coal bed methane gas reserves offer the largest potential opportunity for CHP in the Arkansas mining industry. In addition, the accessibility and relatively low-cost of this opportunity fuel may serve as an incentive for other unrelated businesses to come to the region.

CHP implementation, as discussed within this report, is a cost-based decision that will more than likely coincide with government incentives, rising fuel costs or industry-wide adoption of facilities located near mining sites that can both refine ore while simultaneously producing electricity.

For interested parties, CHP technologies offer a potential opportunity to increase productivity and economic efficiency within the agricultural process. As such, there are numerous government, trade, and support organizations for the implementation of CHP equipment.

The Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) offers *Quick Plant Energy Profiler (Quick PEP)* software on its website to help determine how energy is currently being used and where opportunity exists to save cost and energy. The Department of Energy also sponsors *Industrial Assessment Centers (IACs)* which provide no-cost energy assessments for small and medium sized facilities.

[i] Environmental Protection Agency. Identifying Opportunities for Opportunities at US Coal Mines. Sep. 2008. May 2009. <http://www.epa.gov/cmop/docs/profiles_2008_final.pdf>.

[ii] Environmental Protection Agency. Identifying Opportunities for Opportunities at US Coal Mines. Sep. 2008. May 2009. <http://www.epa.gov/cmop/docs/profiles_2008_final.pdf>.

[iii] Arkansas.gov. Arkansas Geological Survey: Gas. 2007. May 2009 <http://www.geology.ar.gov/fossil_fuels/gas.htm>.

[iv] Montana State University in Bozeman. Department of Land Resources and Environmental Management:Coalbed Methane. July 2009. July 2009 <http://waterquality.montana.edu/docs/methane/cbmfaq.shtml>.

[v] National energy Technology Laboratory. Future Supply and Emerging Resources: Coal Bed Natural Gas.. July 2009 <http://www.netl.doe.gov/technologies/oil-gas/FutureSupply/CoalBedNG/CoalBed_NG.html>.