

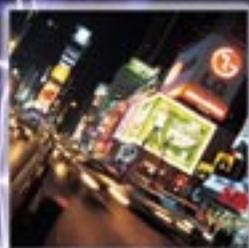
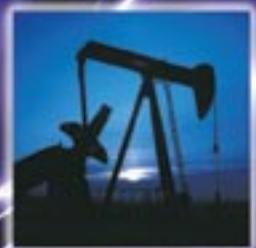


VIEWS & VISIONS

A publication of Bowles Rice McDavid Graff & Love LLP

Fall 2007

Powering Our Future!



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Powering Our Future!

F. Thomas Graff, Jr.,
Bowles Rice McDavid Graff & Love LLP



FROM OUR
MANAGING
PARTNER

This is the fourteenth year that we have published *Views & Visions*. Our first edition was published in the spring of 1993 and was the brainchild of David Hardesty. David recently sent me a copy of the first *Views & Visions* that he found in an old file. It was rather puny compared to the sophistication of this edition, but it served our purpose of involving our firm and its members in the discussion of issues of the day, and continues to serve that purpose today.

This also is a very special issue of *Views & Visions* for me for many reasons. First, the central underlying theme is one of the major unresolved debates of our day: how we achieve future energy independence. Our guest authors include operators, developers, promoters, regulators, politicians, lawyers and The Honorable Joe Manchin, Governor of the State of West Virginia, whose article recognizes our state's importance in the energy world. Significantly, this issue is a collection of important viewpoints by knowledgeable contributors representing diverse sectors of the energy world, each advocating a position or announcing plans for new and innovative projects to improve the energy crunch. Clearly, West Virginia and Kentucky have challenging opportunities in the energy world of the future.

I have spent the better part of my career dealing with legal and business affairs in the coal, oil and gas industries on behalf of numerous firm clients. During that time, I learned that the people in the energy industry have infectious personalities and are, more often than not, unforgettable characters. They all loved the challenge of an industry that was and is dynamic,

frustrating and full of opportunity. I soon developed strong relationships with my energy clients and quickly was exposed to the daily challenges they faced in chasing success in an energy-related business. Like most of our contributing authors, those clients were totally in the energy game and had a lot of what I call the "right stuff."

Taken as a whole, these articles paint a good picture of the challenges our country and our region face with energy independence and environmental protection, and also offer solutions in process or suggestions to confront the challenges. The articles conclusively demonstrate that skilled, knowledgeable and reasonable forces are at work to overcome our energy challenges. In both West Virginia and Kentucky, the wealth of resources, both natural and developed, as well as our talented and experienced people insure that we will be a big part of the future prosperity the energy industry offers. As the Governor recognizes in his comments, West Virginia has always been, is and will be in the future, an "Energy State." I am sure Governor Ernie Fletcher would give Kentucky the same billing.

The final reason I will long remember this issue of *Views & Visions* is because it will be the last issue published during my tenure as the Managing Partner of Bowles Rice. There is a great deal of emotion involved in stepping down from the position of Managing Partner of this firm after 21 years, but there is a corresponding degree of joy involved, too. All of this is really old news in that the decision was made long ago and the transition plan, developed in 2006, is all but performed. That means I am officially a short-termer, but I am not your standard lame duck.

The real good news is that my successor is a lead-pipe cinch to do a great job and take Bowles Rice to the next level. Tom Heywood takes the helm on January 1, 2008, and he is the right person at the right time. He will do a magnificent job as Managing Partner, and I am confident of the continued success of our firm under Tom's leadership.

However, I am not drifting off into the sunset just yet. My plan is to spend the next several years practicing law and continuing in all my current roles except Managing Partner. I welcome the opportunity to devote more of my time to the active practice of law, and I look forward to seeing and working with you in the next phase of my life. ▽

Sincerely,

A handwritten signature in dark ink that reads "Tom". The signature is written in a cursive, slightly slanted style.



Energy and the Environment – Opportunities Abound for Appalachia

Thomas A. Heywood
Bowles Rice McDavid Graff & Love LLP

Tom Heywood is Assistant Managing Partner of Bowles Rice, and a former Chief of Staff to the Honorable Gaston Caperton, Governor of the State of West Virginia. He has significant experience in health care, corporate, finance and commercial law, and is recognized as one of the “Best Lawyers in America.”

Mr. Heywood is active in the community, and in various West Virginia business and trade associations. He serves on the boards of many charitable organizations, including Vision Shared, Imagine West Virginia, the West Virginia Venture Connection, the West Virginia Entrepreneurs Forum, Discover the Real West Virginia Foundation, Thomas Memorial Hospital, West Virginia University Hospitals, the Clay Center and the Kanawha County Library Foundation.

One consequence of the projected increase in world population from 6.6 billion to an estimated 9 billion or more over the next 35 years is significant growth in global demand for energy. Another consequence is the significant increase in pressures on our environment.

Do considerations of our future energy needs suggest an increasingly grim choice between enjoying the comforts of modern life and preserving an environment that can sustain life on our planet? Or do our twin demands, for more energy and more environmentally sustainable forms of energy, portend a bright future?

I firmly subscribe to the latter view. As a result of both market forces and public policy, I believe that the next hundred years will witness dramatic increases in both the production and consumption of energy. I also expect remarkable advances in energy efficiency, and the development and deployment of means of energy production that will be environmentally sustainable far into the future.

The experts appear to agree on several fundamental points about the future of energy:

1. Energy demand will increase rapidly for the foreseeable future. Increases in world population and, perhaps more importantly, the pace of industrialization around the world, will drive energy consumption to significantly higher levels in the decades to come. We all are familiar with media accounts of the phenomenal growth in the economies of China and India. Other economies around the world are industrializing in a like fashion. Energy demand is going up, and going up significantly.

2. To meet projected world energy demand, we will need energy from a wide variety of

sources – coal, oil, gas, solar, nuclear, hydro, biofuels, wave power, and much more. There is plenty of room at the table for all forms of energy. We will need them all, to even begin to meet the projected energy needs of our energy-hungry planet. Price increases across all forms of energy in recent years (remember \$20 a barrel oil and \$2.80/mcf natural gas?) bear testament to a fundamental shift in the demand and supply of all forms of energy in recent years.

3. Markets will continue to do what markets do best – match demand with supply, using price as signals for resource allocation.

Current market signals are stimulating increased interest in energy efficiency (for example, conversion from incandescent light bulbs to light emitting diodes) and stimulating commercialization of numerous technologies that have existed for years, yet have not been commercially developed due simply to market forces. For example, Rentech, Inc., one of the industry leaders in coal-to-liquids (CTL) technology, has proposed a CTL facility in Mingo County, West Virginia. These trends will continue and likely accelerate.

4. Public choice and public policy will create increasing demand for environmentally friendly forms of energy production and consumption.

As new forms of energy have been discovered and developed, human beings have consistently chosen both more efficient forms of energy, and more environmentally friendly forms of energy generation. One need only read accounts of 19th century London, in comparison to the London we see today, to recognize that the trend toward more efficient and environmentally friendly energy is a longstanding one. This trend will continue through market forces and policy choices over the next hundred years and beyond.



Many thoughtful and well informed observers, including Richard Lester of the Massachusetts Institute of Technology and analysts at the Battelle Memorial Institute, are in agreement. They note that Appalachia's rich supply of fossil fuels and rich tradition of energy production, position the region to be a world leader in "advanced energy," that is both environmentally friendly *and* efficient.

To truly realize our potential in advanced energy, we must do more than simply ride the crest of the current wave of energy consumption. Historically, we have simply mined or drilled for our resources, then shipped the resulting product or burned the resource and wheeled the resulting energy to others. There will always be a place for such energy production and transmission activities, but our real opportunity lies in active development and commercialization of technologies that could make Appalachia a world leader in energy research and development well into the future.

We have some phenomenal resources at our disposal. Major advancements are anticipated in the chemistry of energy. At Dow and WVU's research park in South Charleston, West Virginia, we have some of the world's leading experts already hard at work on the chemistry of energy. Morgantown is home to the National Energy Technology Laboratory, a world-class energy research facility.

Great energy research is going on in universities around our region, with researchers developing such products as synthetic pitch or "synpitch," carbon foam and carbon fiber, and various other exciting energy and carbon fuel possibilities. Numerous clean coal technologies and processes are being developed and deployed throughout Appalachia and the Midwest.

West Virginia Governor Joe Manchin has taken an active leadership role nationwide on issues of advanced energy

and energy independence. Businesses across Appalachia are likewise providing outstanding leadership in advanced energy, including the development of new, cleaner burning coal-fired power plants; dramatically expanded natural gas energy exploration and development in the Appalachian Basin; and the development of coal-to-liquids pilots, biodiesel and wind farm projects in Appalachia.

World demands for energy and for a clean environment will continue to grow throughout the 21st century. For all of us in Appalachia, that spells opportunity. Present and future investments by both business and government in these important initiatives will provide a position of world leadership and prosperity for Appalachia for the next hundred years or longer. The future is bright indeed! ▽



West Virginia Has Always Been an Energy State

Governor Joe A. Manchin, III
West Virginia

Joe Manchin, III is West Virginia's 34th Governor. Born and raised in the small coal town of Farmington, West Virginia, Governor Manchin is a graduate of West Virginia University. He is a former member of the West Virginia Legislature, serving 1982-1996. He was elected Secretary of State in 2000 and Governor in 2004.

Governor Manchin serves as Chairman of the Southern States Energy Board and is Chair-Elect for 2008 of the Democratic Governors Association. He is Vice-Chair and Chair-Elect of the Southern Governors Association, Vice President of the Council of State Governments and Chair of the Interstate Mining Compact Commission.

Governor Manchin is an avid pilot, outdoorsman, hunter, fisherman and motorcyclist. He has been married for 40 years to the former Gayle Conelly of Beckley. They are the proud parents of three children and six grandchildren.

Since the late 1800s, when the railroad brought convenient transportation of resources and people to and from the Mountain State, West Virginia has fueled this nation with its massive resources of oil, coal and natural gas. Through two World Wars, the Industrial Revolution and the turn of the 21st century, the people of West Virginia have worked to move our nation and the world forward.

As the nation's No. 2 coal producer and one of the East Coast's largest generators of electricity, there is no question West Virginia is an energy state. Our vast natural resources ensure we will continue to help meet our nation's energy needs for many years to come.

In the last few years, America has learned the hard way about our country's potential energy crisis. Gas prices have hovered around all-time highs, increasing the costs of virtually all goods and services we purchase, and forcing all of us to reconsider our driving habits.

The disaster of Hurricane Katrina in 2005 brought many of our oil refineries to a standstill, and exacerbated already high gas prices. The massive northeast blackout in August 2003 left millions of Americans and Canadians without power and brought the previously obscure issue of our country's power grid weakness to the forefront.

Petroleum imports, which cost the U.S. economy about \$315 billion per year, are the single-largest cause of the negative U.S. trade balance. It is quite evident our country is at an energy crossroads.

Energy independence is crucial to our economic future and national security. More than 60 percent of our petroleum comes from foreign sources – many of which are highly unstable – and our dependency is growing.

America is not prepared for the consequences of the loss of oil imports. A natural disaster or terrorist attack that interrupts our supply could have catastrophic economic impacts, triggering inflation or even a depression. That is why we must take steps to ensure alternative fuels are available, and work toward energy independence.

It is clear to me that regardless of what direction our nation takes, West Virginia will play a huge part in generating our nation's energy. I also see great opportunities to find new uses for West Virginia coal, including powering our cars, trucks and military aircraft through modern coal-to-liquids technology.

I believe we can achieve a balance between meeting our nation's energy needs and preserving West Virginia mining jobs, while being stewards of the land. It is imperative that we invest in the latest technology that enables us to help meet our energy needs and take care of our environment. West Virginia's utility companies are making great strides in improving the way we use our coal.

For example, in May, I joined GenPower and local officials to break ground for the Longview Power Plant in Monongalia County. This \$1.8 billion investment not only is the largest private investment in the state's history, it's also an ultra-modern and environmentally responsible design that will make it the cleanest plant of its type and size in the United States. This plant will use drainage from a Greene County, Pennsylvania mine for its cooling water and boiler water to help preserve and protect our local watersheds.

Appalachian Power parent company American Electric Power (AEP) is investing \$3.6 billion through 2010 to retrofit a number of its coal-



fired power plants with environmental controls that will reduce nitrogen oxide and sulfur dioxide emissions that are created when coal is burned for generating electricity.

Both AEP and Allegheny Energy have proposed new electricity transmission lines as part of the federal government's designated National Interest Electric Transmission Corridor, a federally mandated project designed to alleviate the electricity transmission congestion problems that caused the 2003 blackout. The state Public Service Commission is currently reviewing possible locations for Allegheny's 500-kilovolt Trans-Allegheny Interstate Line (TrAIL).

We have not made any recommendations or made any decisions about the location of the line. That decision is up to the Public Service Commission, and I am confident the PSC can find the least intrusive routes possible and will do so in a timely manner that protects the interests of West Virginians. Our administration is committed to ensuring that West Virginians do not disproportionately bear the cost of lines that deliver electricity outside the state.

Continued discussion about this issue is important, as we recognize the electricity transmission congestion problems and West Virginia's role in alleviating them. However, it should also be noted that with

the increased capacity created by new lines, West Virginia will be able to sell more of its excess power to other states. This will benefit West Virginia's ratepayers, energy industry and overall economy for years to come.

While the methods for mining coal, extracting natural resources and for generating and transmitting electricity have dramatically changed in 100 years, West Virginia's role in powering our nation is much like it was at the turn of the 20th century. With careful management, responsible environmental procedures and modern technology, West Virginia will remain a key player in our nation's and our world's energy future. ▽

National Research Center for Coal and Energy at WVU: Where Energy Solutions Start

Richard A. Bajura, Director
Trina Karolchik Waffle, Deputy Director
National Research Center for Coal and Energy



Dr. Richard Bajura serves as director of the National Research Center for Coal and Energy at West Virginia University. For more than 20 years, Dr. Bajura has developed research programs that team the research faculty across West Virginia University's colleges and departments with other energy and environmental experts nationwide.

Dr. Bajura is active with the American Society of Mechanical Engineers Energy Committee; a member of the National Coal Council; the Washington Coal Club; the Coal Utilization Research Council; the Pittsburgh Coal Conference Advisory Board; and the U.S. Department of Energy Fossil Energy Coal Programs Strategic Planning Committee.

Dr. Bajura also has served with the West Virginia EPSCoR program since 1989 and is the current director of the DOE EPSCoR State program. He served as the State EPSCoR project director from 1990 to 1992.

Dr. Bajura earned his bachelor's, master's and doctoral degrees from the University of Notre Dame, specializing in fluids engineering. Before coming to WVU, Dr. Bajura was a research associate at Johns Hopkins University and a research engineer at Babcock & Wilcox R&D Center.

Ms. Waffle has been involved in the communications about, and administration of, energy and environmental research and service programs since joining the National Research Center for Coal and Energy in 1982.

She serves as deputy director and assists in the broad oversight of the Center's research, service, operational and communication matters. She also is director of the NRCCE Technical Communications Division, which operates a conference and distance learning facility, center-wide website and related communications services.

Other NRCCE programs in which Ms. Waffle has been involved include the National Mine Land Reclamation Center, the National Small Flows Clearinghouse, the National Environmental Services Center, the National Alternative Fuels Training Consortium, the Advanced Power and Electricity Research Center, and the WV-DOE EPSCoR State Implementation Program. She holds a B.A. degree in English, cum laude, from West Virginia University.

Energy is in the spotlight again, nowhere more so than in West Virginia. In an April interview on Fox News's *Fox & Friends*, West Virginia's own Governor Joe Manchin listed conservation, biomass and biofuels, wind, solar and carbon with carbon sequestration all as viable options when asked whether the nation could become energy independent by 2030.

Nearly all these options are of interest to the West Virginia University National Research Center for Coal and Energy (NRCCE), with programs in conservation; environmental remediation; coal processing; coal-to-liquids; hydrogen fuel cells; alternative transportation vehicles; oil and gas; and other energy and environmental topics.

Success Starts with Partnering

The NRCCE does not do its work alone. The center forms partnerships, starting with top-notch research faculty in the colleges and schools of West Virginia University. NRCCE program managers also seek researchers at other energy-related universities and at national laboratories, such as the National Energy Technology Laboratory, with facilities in Morgantown, West Virginia and Pittsburgh, Pennsylvania. Program managers also invite industry participation directly in the research, or as advisors.

NRCCE has more than a dozen different energy and environmental programs. The following four exemplify the benefits of partnership to the state.

Partners in Energy Efficiency

An NRCCE program called Industries of the Future - West Virginia (IOF-WV) is a case in point. In February 1997, NRCCE's Carl Irwin invited Denise Swink and Charles Sorrell, then with the U.S. Department of Energy's Industries of the Future program, to tour WVU's carbon research laboratories and UCAR Carbon Company in Clarksburg, with which the university was working. While driving the 45 miles between Morgantown and Clarksburg, Irwin mentioned to Swink that energy-intensive companies were very prominent in the state, prompting her to ask, "What about a state IOF program?!"

That sparked Irwin to contact Jeff Herholdt, then director of the West Virginia Development Office's State Energy Program, resulting in IOF-WV, an award-winning WVU-State-industry



The NRCCE's West Virginia Water Research Institute has helped clean up the acid mine drainage in the Cheat Watershed. Brady Gutta, a researcher with the WVWRI, and his 3-year old son enjoy fishing in Cheat Lake, now one of West Virginia's finest spots for large mouth bass and walleye.

partnership and NRCCE's signature energy efficiency program.

Among IOF-WV's successes are a new diagnostic and control system in Century Aluminum's potroom operation that can save as much as \$15 million per year. Improved materials for galvanizing line hardware in steel operations are estimated to save 2 trillion BTUs and \$46 million per year for the 57 galvanizing lines operating in the U.S.

Partners for the Environment

The NRCCE's West Virginia Water Research Institute (WVWRI) also has a longstanding tradition of partnering. Early in his tenure with NRCCE, WVWRI Director Paul Ziemkiewicz recognized the power of visiting companies at their sites and touring abandoned mines with professionals from the West Virginia Division of Environmental Protection (WV DEP).

In the 1980s, Ziemkiewicz brought together WVU faculty, the WV DEP, the watershed group Friends of the Cheat, the U.S. Office of Surface Mining and Anker

Energy to test watershed-wide concepts to restore the Cheat River. The ideas worked.

Today, Idaho-based anglerguide.com notes that "the 1,730-acre lake in Monongalia County ... [Cheat Lake] is now one of the better largemouth lakes in the state, according to results of bass tournaments held there. Walleyes may soon be stealing some of the limelight."

More recently, WVWRI's researchers have turned their attention to closed and abandoned deep mines that contain billions of gallons of water that could be used in steam turbines to generate electricity in areas of the state with limited surface stream water. Since power plants require pristine water to operate, the concept being explored by the WVWRI could result not only in a new economic activity, but one that can pay to clean the water.

Partnering for Coal-to-Liquids

More than 20 years ago, NRCCE Director Richard Bajura saw the looming transportation fuel crisis facing the country today.

(continued on p. 51)

Programs of the NRCCE

- The U.S. Department of Energy Experimental Program to Stimulate Competitive Research
- The Consortium for Fossil Fuel Science
- Environmental and Economic Impacts of Coal Liquefaction
- The National Alternative Fuels Training Consortium
- Industries of the Future – West Virginia
- The Appalachian Oil and Natural Gas Research Consortium
- The Petroleum Technology Transfer Council
- The Zero Emissions Research and Technology Center
- The Center for Advanced Separations Technology
- The West Virginia Water Research Institute, including the
 - > National Mine Land Reclamation Center
 - > Hydrology Research Laboratory
 - > Northern West Virginia Brownfields Assistance Center
 - > Combustion By-products Research Consortium
- The National Environmental Services Center, including the
 - > National Small Flows Clearinghouse
 - > National Onsite Demonstration Program
 - > National Drinking Water Clearinghouse
 - > National Environmental Training Center for Small Communities
- U.S.-China Energy Center



The Energy Economy

Charles E. Bayless, Provost
WVU Institute of Technology

Charles E. Bayless returned to his home state and alma mater in April 2005, when he was named Provost of West Virginia University Institute of Technology in Montgomery, West Virginia. Provost Bayless grew up in Dunbar and Nitro, West Virginia and earned a B.S. degree in Electrical Engineering from WVU Tech in 1968. In addition, he earned a master's degree in power engineering and a law degree from West Virginia University, as well as an MBA from the University of Michigan.

Prior to his return, Provost Bayless earned an extensive reputation as a leader in the energy industry, serving as Chairman, President and CEO of Illinois Power Company until 1999. Prior positions included Chairman, President and CEO of Tucson Electric Power in Tucson, Arizona; and Senior Vice President and Chief Financial Officer of the Public Service Company of New Hampshire from 1981 to 1989.

Provost Bayless currently serves on the board of directors of companies including Pike Electric in Mt. Airy, North Carolina and West Virginia American Water Company in Charleston, West Virginia. In addition, he serves as Chair of the West Virginia Chamber's Energy Committee.

He has been the recipient of CEO of the Year Awards from both the Wall Street Transcript and Financial World. Provost Bayless also has maintained his life-long interest in the Boy Scouts of America by serving on its national board of advisors and formerly serving on its national board of directors.



Our economy moves on energy. Whether it is an obvious use of energy such as an airplane or a more subtle use such as an electronic purchase, no transaction is possible without energy. For years energy was cheap, plentiful and taken for granted. Today, energy is expensive, scarce and unfortunately, still taken for granted. That must change, for if we do not voluntarily reduce our energy consumption, the laws of economics will reduce it for us – and we won't like the result.

In 2003, although the United States comprised about 4.6 percent of the world's population, we used about 29.6 percent of the world's energy – but we also produced about 26% of the World's gross domestic product (GDP). However, this usage is on a collision course with the ever-increasing energy usage of the developing nations

as they make the inevitable transition from labor economies to energy economies – a transition that was made in the United States over 100 years ago.

To understand the drive forcing this transition, let's put you in the labor economy. It's easier than you may think. Imagine that your car is out of gas five miles from the nearest exit in a snowstorm. You are now firmly in a labor economy. What would you now pay for energy? Or, in other words, "What is energy worth to you if you use it to transform from the labor economy to an energy economy?" The answer is, "A lot more than gasoline at \$3.00 per gallon," and so the developing nations will continue to bid up prices to transform their lives.



The average third-world citizen has far easier access to energy and energy-using devices than we did when the United States made the transition in the 1800s, thus facilitating a quicker move to an energy economy. Today, a supertanker can go to Hong Kong as easily as it can go to Houston. We had to invent automobiles, machinery and appliances to consume energy. Today these devices are not only available in many areas of the third-world, they manufacture them. This also allows their transition to proceed much faster than ours.

The United States has only about 4 percent of the world's total natural gas and oil reserves, so we are absolutely dependent on imports. But we also have about 25 percent of the world's total coal reserves, many of them in West Virginia. To achieve energy independence as a nation, we have no choice but to turn to coal, renewable energy and conservation. In the long-term, nuclear power can supply a great deal of our energy, but in the short-term, coal, renewables and conservation are our best hopes.

We must adopt energy efficiency as a national mandate. Cheap energy led

to a whole generation of wasteful cars, appliances and practices. Energy efficiency will begin to be viewed as an economic necessity by industries and consumers beset by higher prices.

Next, we must learn to recycle wasted energy. A steel plant, for instance, may discharge millions of BTUs into the atmosphere from its blast furnaces. Many steel companies are now using this waste heat to generate electricity.

We also must learn to transform energy from one form to another more efficiently. In 2003, we put about 39.5 quadrillion BTUs (Quads) into electric power production and got only about 13 Quads out. That approximately 26 Quads were wasted in the conversion process was primarily due to the laws of physics that apply to the power cycle. Research is now underway to convert coal to natural gas before burning it in a power plant, such as the proposed AEP Integrated Gasification Combined Cycle Plant. This type of plant should raise the overall efficiency from about 35 percent to approximately 45 to 50 percent. The increased use of coal, however, must be tempered by the

increasing realization that global climate change is a serious environmental issue.

Energy will play an increasing role in West Virginia's economy, but its development is complex and affects many interests. As a State, we must put policies in place in the next few years to deal with this increased use of coal. By starting now to develop rational land-use and permitting policies, mining regulations, and the host of other laws and regulations that would be necessary to deal with a doubling of coal production, we can deal with the issue in a deliberate, thoughtful process. The alternative is to wait until the wolf (energy shortage) is at the door and we have to adopt hurried policies under the threat of federal preemption if the shortage is severe enough. Further, we must continue the push to fund research into efficiency, clean coal technology and carbon sequestration.

As the history of our Nation is written over the next 100 years, I believe that one of the most important determinants of our future will be how we handled the energy situation. The time to start writing is now. ▽



Kentucky's Role in Energy Independence

Secretary Teresa J. Hill
Environmental and Public Protection Cabinet

Teresa Hill is secretary of the Environmental and Public Protection Cabinet, where her efforts are focused on helping Governor Ernie Fletcher grow Kentucky's economy and protect Kentucky's environment.

Ms. Hill previously served as vice chairman of the Kentucky Public Service Commission. She also has served Governor Fletcher as executive director of boards and commissions and executive director of legal services in the Commerce Cabinet.

She is an attorney and a former journalist, and practiced law in Corbin, Kentucky prior to entering public service.

State governments across the country continue to address a list of concerns about health care, insurance and funding for education. Energy-related matters have moved to the forefront of that list.

Rising fuel costs, specifically transportation fuels, have sparked America's renewed interest in attaining energy independence. In the hope of increasing domestic sources of alternative and renewable energy, states are moving quickly to enact legislative packages that encourage companies to locate such facilities within their boundaries, while alleviating environmental concerns.

The United States imports more than 60 percent of its oil – much of it originating in areas that are historically unstable. Kentucky, in contrast to other states, is uniquely positioned to play an important role in America's quest for energy independence. With its geographically central location and its abundance of resources, the Commonwealth can play a critical role in this effort.

Achievement of this goal will require a multi-faceted approach, with efforts that include development of alternative fuels and production facilities, renewable energy sources and measures to promote and increase efficiency and conservation.

Alternative Fuels

First, alternative fuels and production facilities must play a significant role in achieving energy independence. Alternative fuels range from traditional transportation fuels such as ethanol to technology-driven products. These products include the conversion of coal-to-gas, for use as a synthetic form of natural gas, and coal-to-liquid techniques, in which coal is converted to a diesel fuel that can be used for jet transportation and other uses.



Currently, there are several large alternative fuel facilities in Kentucky, including a 33 million gallon per year ethanol plant in Hopkinsville, located in the western part of the state. While conventional ethanol plays a role, its production can also impact the price of corn – an essential component of many products and serves as a feedstock for farmers. For that reason, resources also are being dedicated to production of cellulosic ethanol, which is created from biomass products such as paper pulp, sawdust and certain vegetation such as switchgrass.

Coal conversion to gas or liquid state is also a very promising technology. Such technology is not new. The most common method of coal liquefaction is called the Fischer-Tropsch method and was developed in the 1920s. It has been operating on a commercial scale in some locations, including South Africa, where one



plant has produced more than 1.5 billion barrels of fuel – approximately one-third of that country’s entire fuel consumption – and reducing their reliance on foreign oil from unstable regions of the world.

Currently, there are 19 coal-to-gas facilities in the United States, located in eight states. An additional 21 states are in the process of trying to attract such facilities. No commercial coal-to-liquid facilities exist in the United States, but Kentucky – along with other states, including Indiana, Illinois and West Virginia – are competing to attract such facilities. In fact, Illinois, Indiana, Ohio, Mississippi, Texas, West Virginia and Wyoming have been very aggressive in enacting new laws and adopting incentive plans.

One current proposal would include the construction of a \$3 billion facility in western Kentucky which would generate an estimated 3,000 construction and related jobs in the first five years. Upon operation, it would maintain around 250 jobs with an average annual salary of \$50,000. There would be an increase in other job opportunities in mining and related industries, as suppliers and ancillary businesses would likely locate in the area. The enormous value-added impact of these facilities on the local economy would be critical for the future economic development of the 19 communities identified as potential sites by the Kentucky Governor’s Office of Energy Policy.

Renewable Sources of Energy

Second, renewable sources of energy, such as solar and wind power, are another component in the effort to attain energy independence. The most obvious benefit of such sources is the environmental factor relating to air emissions. Virtually zero emissions result from use of either of these forms of power generation. Although Kentucky’s climate and topography present challenges in this regard, the state has enacted legislation promoting these resources. In 2006, “net-metering legislation” was passed. It allows for businesses or residences to generate solar power while being connected to the power grid, and provides for a credit to the customer for power created in excess of that consumed and transferred to the grid.



Efficiency and Conservation

Third, efforts to maximize efficiency and to conserve energy consumption are equally important. Kentucky’s recently adopted building code mandates the use of higher insulation (“R” factors) for insulation, roofing materials and glass. The state is increasing its efforts to utilize Energy Star® products in its procurement practices and business plans. The state automobile fleet includes a number of hybrid vehicles that operate with improved fuel economies. State agencies also are promoting seemingly simple measures, such as lowering thermostat settings by



one degree or replacing incandescent bulbs with compact fluorescents that burn far less energy. Collectively, these efforts can play a significant role and dramatically decrease energy consumption by business, government or residential users of electricity.

A commitment by both the public and the private sector, as well as support and participation by citizens are required elements of success for:

- the promotion of alternative fuel facilities by business and government, or the use of such fuels by consumers; and
- the development of more energy-efficient standards by government, or the consumer’s willingness to accept potentially higher initial costs of such standards (with savings incurred over the long term).

With a collaborative effort and the use of current and evolving technology, it is possible to reach the goal of energy independence in an environmentally responsible way. While the Commonwealth has gotten off to a good start, we have not made it to the finish line. Kentucky must continue to pursue opportunities to best utilize its competitive advantages and fulfill its rightful role as a national leader in our effort to attain energy independence. ▽

Sequestration of Carbon Dioxide Emissions in Unmineable Coal Seams

Marshall S. Miller, CEO & Chairman
K. Scott Keim, President
Marshall Miller & Associates



Marshall Miller is CEO and Chairman of Marshall Miller & Associates, an engineering and geological consulting firm he established in Bluefield, Virginia in 1975. Today, the company represents one of the largest engineering consulting firms operating in the Appalachian Region.

Mr. Miller received his B.S. and M.S. degrees in Geology from West Virginia University. His career involved two years with Schlumberger Well Services; four years in coal research in Charlottesville, Virginia with the Virginia Division of Mineral Resources; and two years with Pocahontas Land Company in mineral land management and exploration before establishing his own consulting firm.

Throughout his career, he has authored many professional publications dealing primarily with mining; geology and development of fossil fuel resources; and environmental studies. He was inducted into the Business Hall of Fame by the WVU School of Business and Economics and received the WVU Academy of Distinguished Alumni by the College of Arts and Sciences. He also received his honorary Ph.D. (Doctor of Science Degree) in Geology at WVU.

Scott Keim has held multiple positions within Marshall Miller & Associates since joining the firm 27 years ago and is currently President of the company. A graduate of The Pennsylvania State University in Geology and a Certified Professional Geologist, Mr. Keim has conducted and supervised a multitude of major merger and acquisition studies throughout the U.S., as well as feasibility studies in Venezuela, Mexico, the Czech Republic, Colombia, Canada and China.

Mr. Keim is responsible for the review and coordination of all corporate project activities including reserve evaluations, predictive geological mapping, merger and acquisition evaluations, geological and engineering applications, feasibility studies, geologic and engineering assessments, environmental applications and geophysical operations.

Mr. Keim is a recognized member of the Society for Mining, Metallurgy and Exploration (SME) of AIME, the Central Appalachian Section of SME, and the American Institute of Professional Geologists. He is a Certified Professional Geologist in Kentucky, Virginia, and Kansas.

Considerable media coverage has recently been given to global warming and proposed measures to reduce greenhouse gas (GHG) emissions in the United States and worldwide. Responding to these issues, the U.S. Department of Energy established seven regional partnerships that include more than 350 state agencies, universities and companies that span 41 states, two Indian nations and four Canadian provinces.

The partnerships were charged with evaluating the options for capturing, transporting and permanently storing or sequestering carbon emissions from coal-fired electrical generation facilities and other large emitters of GHG. The sequestration projects include both terrestrial and geologic projects. Although reforestation and other terrestrial projects have other benefits, geologic sequestration shows much more promise in reducing the atmospheric accumulation of GHG. Consequently, the DOE projects are largely focused on geologic sequestration in depleted oil and gas fields, saline aquifers and unmineable coal seams.

Within the Southeast Regional Carbon Sequestration Partnership (SECARB), the partnership covering 11 southeastern states, the DOE commissioned the Virginia Center for Coal and Energy Research at Virginia Tech and Marshall Miller & Associates, Inc. (MM&A) to conduct an assessment of the carbon sequestration potential of Pennsylvanian-age coalbeds in the Central Appalachian Basin. The Phase I study, initiated in April 2004, included a review of the coal geology and coalbed methane (CBM) development in a limited, but high-potential area in southwestern Virginia. Evaluated coals include those comprising the Pocahontas Formation and the overlying Lee Formation (New River Formation in West Virginia). Study results indicate that these coals appear favorable for carbon sequestration because of their thickness, depth, rank and permeability characteristics.

Due to the encouraging Phase I results, the DOE approved funding for a Phase II study from October 2005 to September 2009, in which the study area was expanded to include a larger area in southwestern Virginia, several counties in southern West Virginia and a small area in eastern Kentucky. In Phase II, SECARB will conduct a pilot carbon dioxide (CO₂) injection project at a site in Russell County, Virginia to further define the sequestration potential.

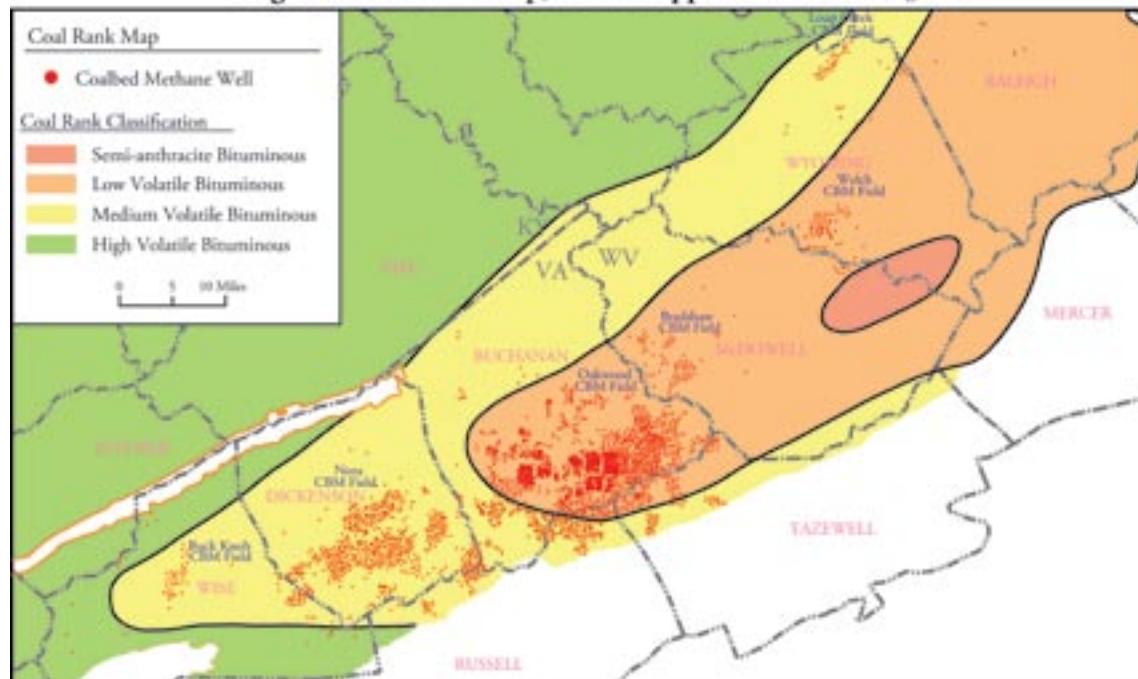


The Regional Coal Rank Map (see Figure 1) delineates the areas of low volatile and medium volatile bituminous coals, which are most favorable for sequestration. It also indicates the location of the major CBM fields which have been developed in the region.

CBM producing wells, where it is recovered for sale, thereby enhancing the economic feasibility of sequestration in coal seams. The presence of major GHG emitters, the electrical generation facilities in or near the coal fields, further enhances sequestration economics by limiting the cost of transporting the CO₂ from source to sink.

capacity in the unmineable coal in the Lee and Pocahontas Formations in southwestern Virginia and southern West Virginia totals 1.34 gigatons. ECBM recovery that could potentially result from carbon dioxide injection is estimated at 2.5 trillion cubic feet, or approximately three times the total CBM production from the study area to date.

Regional Coal Rank Map, Central Appalachian Basin (Figure 1)



Put into context, the estimated sequestration capacity represents 350 years of CO₂ emissions from American Electric Power's 713 megawatt electrical generation plant in Russell County, Virginia, located near the Phase II injection pilot site.

Negotiations of pilot-site agreements with the coal owner and CBM operator are nearing completion. Core drilling to obtain coal-seam data will be initiated later this year, followed by CO₂ injection into a converted CBM

Coal presents an attractive sequestration target because it has a great affinity for CO₂ and is able to contain nearly twice the volume of CO₂ as it does methane gas. Both gases are adsorbed on the coal surface rather than being compressed into pore spaces, as in conventional carbonate and sandstone gas reservoirs. When injected CO₂ comes into contact with the coal surface, it is adsorbed and methane gas is released.

The released methane gas is then able to flow through the coal cleats to adjacent

Also important is the fact that many existing CBM wells (more than 5,000 in the Central Appalachian Basin) could be converted to inject CO₂, thus greatly reducing the potential capital requirement to implement a sequestration project.

Preliminary results of the work by MM&A and Virginia Tech indicate that Central Appalachian coals have significant CO₂ sequestration and enhanced coalbed methane (ECBM) recovery potential. The current estimate of CO₂ sequestration

well in 2008. The testing will enable verification or revision of the estimated sequestration potential. The DOE already plans to award a limited number of the current project teams with funding to commence large-scale field injection tests over seven to ten years. MM&A and Virginia Tech believe that their project team has good potential to be selected by the DOE to design and engineer the larger coal-seam test in the Central Appalachian Basin. ▽



West Virginia's Role in the Future of Coal Mining Technology

Dr. Syd S. Peng, Charles E. Lawall Chair in Mining Engineering
The Department of Engineering, West Virginia University

Dr. Syd Peng is the Charles E. Lawall Chair in Mining Engineering, Department of Mining Engineering at West Virginia University in Morgantown, West Virginia.

Dr. Peng received his undergraduate diploma in mining engineering in Taiwan. He came to the U.S. in 1965 for advanced study and received his Ph.D. in mining engineering from Stanford University in 1970.

He worked for the U.S. Bureau of Mines, in charge of rock physics research, before joining West Virginia University in 1974. In 1978 he was appointed as chairman of the Mining Engineering Department, a position he held until September 2006. In 1985, he established the Longwall Mining and Ground Control Research Center and assumed its directorship.

Dr. Peng has authored and co-authored four textbooks and hundreds of journal and proceedings articles.

In 1981, he initiated the annual International Conference on Ground Control in Mining, now recognized all over the world as an annual forum for exchange of information. Dr. Peng is frequently invited to lecture or chair conference sessions in the U.S. and all major coal producing countries.

He is a member of the National Academy of Engineering and is the recipient of numerous awards. In 2007, he was inducted into the West Virginia Coal Hall of Fame and was elected to the National Academy of Engineering.

In coal mining, underground mines are much more complicated and require many more branches of technology than surface mines. Since West Virginia is the leading underground coal producer, it sets the trends in the industry. Most coal mining equipment was either developed in West Virginia or, if developed elsewhere, tested first in West Virginia coal mines for its applicability. This trend undoubtedly will continue for the foreseeable future because there are so many underground coal mines in West Virginia that cover the full range of mining and geological conditions encountered in the industry.

A typical example is the introduction and development of longwall mining technology over the past 50 years. Developed in Germany, longwall mining was first introduced in

southern West Virginia for low coal mining in the early 1950s. It became a viable method after the introduction of shield supports in a northern West Virginia mine. Through the hard work of creative people in the U.S. coal industry, and in West Virginia in particular, the imported system was quickly adapted and developed into the U.S. technology that has been the standard of longwall mining all over the world since the early 1990s (Fig. 1).

A recent example can be seen in the new requirements put in place after the Sago, WV Mine disaster. West Virginia is setting the technical trends for requirements for emergency shelter, wireless communication, and miner tracking, as well as mine seal design for underground coal mines.

Figure 1
Longwall Mining

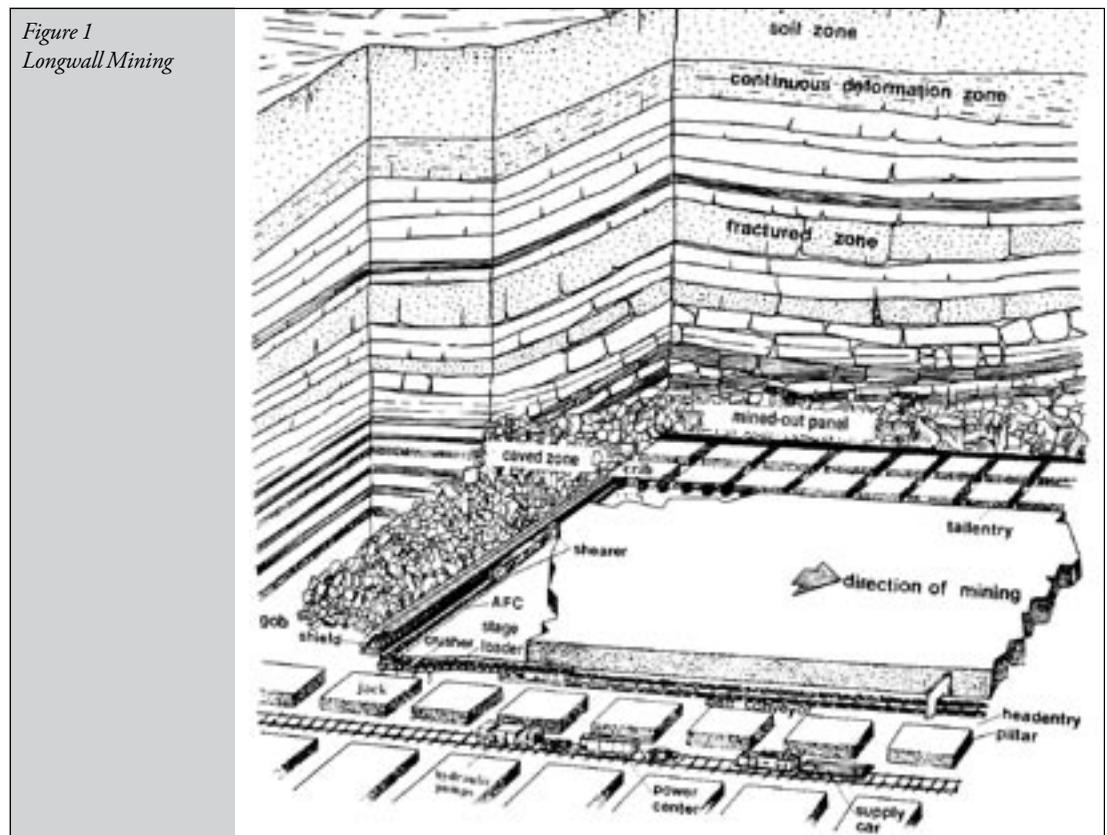
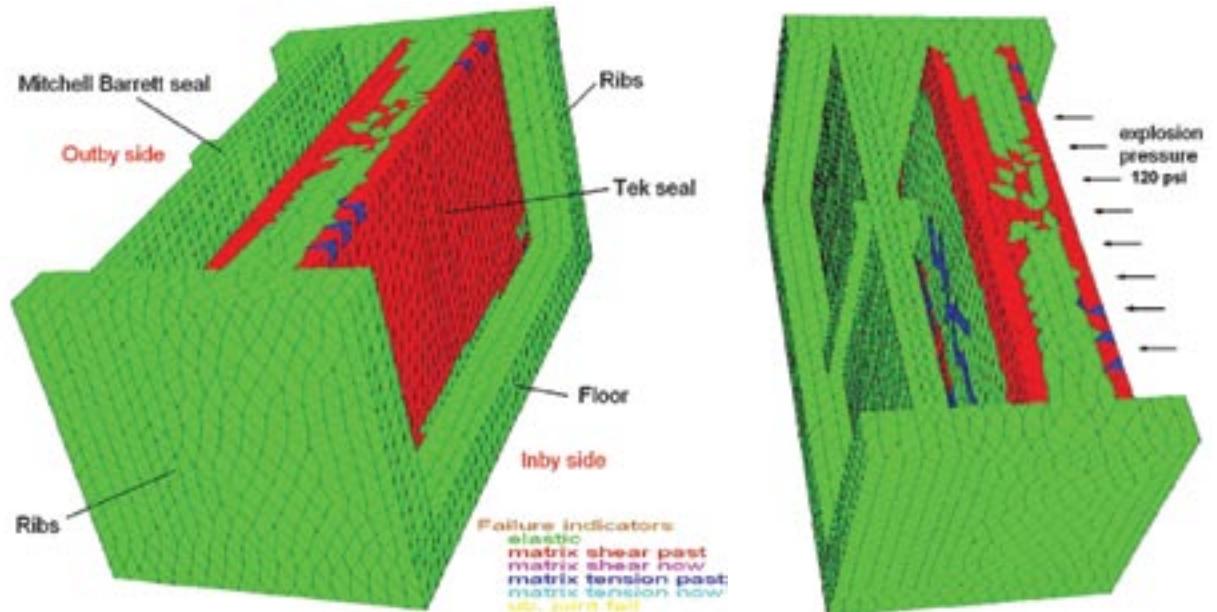




Figure 2 shows the numerical model of mine seals in two different views. The seal on the outby side is Mitchell Barrett seal and the one on the inby side is the Minova Tek seal. The color legend indicates the failure status of elements of the seal model after subjecting the model to 120 psi explosion overpressure.

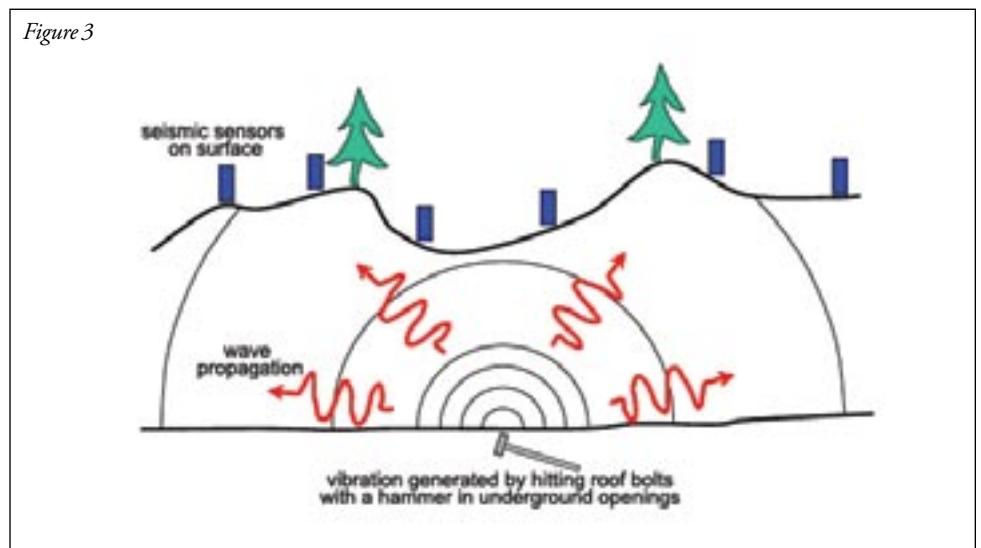


As the “easy” coal is depleting quickly, especially in central Appalachia, coal mining is concentrating on the remaining reserves that are located either deeper in the ground or in more complicated and adverse geological and mining conditions, both of which require much more sophisticated technology to mine safely and economically.

At West Virginia University, we have been working on developing new technologies applicable to underground mining. Most importantly, two trend-setting projects stand out in the past 18 months since the Sago disaster. One is a new mine seal design to meet the new standard of resisting 120 pounds per square inch (psi) explosion pressure. The other is a seismic method of detecting and locating miners trapped underground.

In the new mine seal design, we have been working in cooperation with the National Institute for Occupational Safety and

Figure 3



Health (NIOSH) and with several coal companies to develop new mine seals that will survive explosion pressure larger than 120 psi under various geological and mining conditions encountered in underground mining. Presently, we are performing computer modeling using the latest software available to explore all possible scenarios (Fig. 2).

In conjunction with several vendors, we have been testing a seismic method of communicating with and locating miners who are trapped in West Virginia coal mines. By testing existing systems available in the market, we hope to define the system requirements for locating miners trapped in underground coal mines of various geological and mining conditions (Fig. 3). ▽



Will West Virginia Coal Be Allowed To Do Its Job?

Andrew B. Jordon, Chairman
West Virginia Coal Association

Andrew Jordon is a Charleston native and a mining engineering graduate of Penn State University. He has worked in the West Virginia coal industry for 26 years and has operated his own mining company since 1992.

Pritchard Mining Co. has three mines in Kanawha and Boone counties, with a fourth under development on Paint Creek. Total employment is 133, and annual production stands at 1.5 million tons a year.

In addition to its business successes, Pritchard Mining has compiled an enviable record in safety, reclamation and community involvement. The company won a national reclamation award in 2006, and is a regular at ceremonies for the Mountaineer Guardian Mine Safety Awards.

Mr. Jordon is beginning his second term as Chairman of the West Virginia Coal Association.

Through all the cycles of prosperity and hard times that West Virginia has seen over the last hundred years, the one constant has been that the coal industry is the key to the State's economy.

As a major employer and taxpayer in West Virginia and perhaps of even more importance, the major supplier of energy, the current role of coal comes down to this: It is the industry's job to consistently produce 150 million tons of coal year-in and year-out. This is the equivalent of six million truckloads, or 100,000 river barges, or 15,000 coal trains of 100 cars each.

This production figure, which has been achieved 16 of the last 18 years, currently generates over 20,000 direct and 25,000 contract jobs, as well as over \$300 million in severance taxes. It also equates to about 15 percent of the United States' annual production of coal, the nation's most abundant and readily available source of energy.

West Virginia ranks number two among the 50 states in annual coal production, second only to the vast surface coal fields of Wyoming. The Mountain State is first in eastern coal production, first nationally in underground tonnage and first in coal exports to customers in 25 countries around the world. West Virginia's annual coal production is valued at over \$5 billion.

Together, West Virginia's coal industry and the coal burning electric generation industry represent nearly 60 percent of the business taxes paid to the State. Coal is responsible for nearly \$4 billion, or 13 percent, of West Virginia's gross state product.

Its workers earn an average of over \$60,000 a year, more than double the wage of the average West Virginian. Total direct wages amount to more than \$1 billion per year. About 99 percent



of electricity in the state comes from coal, at a cost of less than 40 percent of the rates paid by citizens of non-coal states.

The tools available to do this job are considerable. The Mountain State has been blessed with the highest quality coal in the world. Remaining coal reserves ensure a plentiful supply for many generations yet to come.

Through 100-plus years of experience, West Virginia has the finest coal miners in the world. Nearly all the important technological advances in the last two or three generations have been developed and/or perfected in West Virginia. The capital investment in this state by coal companies of every size has been truly remarkable.

On the other hand, the challenges facing the industry also are formidable. West Virginia



Pritchard Mining Company's Dry Branch, West Virginia mine

coal must compete in a world market against foreign nations where worker safety and environmental protection hold low priority. Taxes on coal are higher than ever before. Wages have steadily increased, while coal prices have not always done so.

Significantly, we are about to mark the thirtieth anniversary of the passage of the Surface Mining Control and Reclamation Act of 1977. This landmark federal legislation directly addressed the environmental concerns of surface coal mining, but also had a great effect on the underground mining industry. Federal standards were put into place not only to protect the environment, but to create a “level playing field” for coal producers across the country.

For three decades, policy development, practical application and continual litigation have evolved the original legislation into a regulatory framework that is ever more restrictive. The coal operators of even one generation ago would scarcely recognize the regulatory climate in which today's industry is obliged to operate.

Due to the geologic configuration of its coalfields, West Virginia's industry has been presented with an even higher

challenge to continual coal production while maintaining environmental stewardship. Time after time, West Virginia's coal operators have met these challenges.

In very recent years, an increased demand for coal has driven prices up and in some quarters, the dangerous assumption has been made that coal's future is assured. But prices are already trending back downward, obedient to the ever-present rule of cyclical economics.

Simultaneously, West Virginia coal is under a renewed and vigorous attack by those who continually seek to severely curtail the production, sale, transportation and use of the nation's most abundant source of energy.

Even more troubling, this legalistic attack on the industry is aimed directly at West Virginia, which has become an experimental training ground for more general attacks on the coal industry as a whole.

The most dangerous implication of these developments is that the capacity for coal production nationwide and worldwide greatly exceeds demand. In other words, as important as coal is to powering the

nation, it does not have to come from West Virginia. The majority of the State's most prolific producers are multi-state or international companies, with wide-ranging coal reserves.

A significant reduction in the production capacity of West Virginia mines would simply force these companies to shift operations elsewhere to maintain production commitments. At the same time, such changes would be devastating to the State of West Virginia and to its people.

A stark example of this occurred a few years ago in Logan County. A major operation and some 200 jobs were permanently transferred to Wyoming in the face of a federal ruling that applied only to West Virginia, and which was subsequently overturned by a higher court.

Already, a dangerous slippage of annual West Virginia coal production has occurred. Tonnage figures for the last five years were behind the previous five years by nearly 20 million tons annually.

Again, it is the industry's job in West Virginia to mine 150 million tons of coal this year.

We are running behind. ▽



Coal's Role in Kentucky's Energy Future

William K. Caylor, President
Kentucky Coal Association

Bill Caylor became president of the Kentucky Coal Association in January 2001. Before assuming the presidency of KCA, he served as its vice president and general counsel since 1976. He received a B.S. degree in civil engineering from the University of Kentucky's College of Engineering and earned his Juris Doctor degree from the University of Louisville's College of Law.

Although his expertise is environmental law, Mr. Caylor is knowledgeable in all aspects of Kentucky's coal industry and understands the complex issues confronting it. For the past 29 years, he has served as a registered lobbyist representing the industry.

The professional societies of which he is a member include the Kentucky Bar Association, the Kentucky Society of Professional Engineers and the Lexington Coal Exchange. He has served as Chairman of the Natural Resources Committee on Coal. He also serves as the treasurer for the Kentucky Mining Institute and is co-founder of the Kentucky Professional Engineers in Mining Seminar.

Coal is America's silent workhorse, providing cheap, dependable electricity. Coal has a very bright and very positive role in Kentucky's energy future. It is abundant, affordable, reliable, clean and provides thousands of jobs.

On a variety of issues, from mine safety to global warming, coal-to-liquids to mountaintop mining, members of the news media have been very harsh on Kentucky's coal industry. At times this criticism is deserved; sometimes it makes a valid point, but is exaggerated; and in some cases, it can be flat wrong and hurtful.

Let me touch on a few areas.

Safety. We had a tragic year in 2006, but what the press won't tell you is the statistical fact: today's Kentucky coal miner is safer from injuries than the average Kentucky worker – including those in construction, manufacturing, farming, forestry, transportation and the health care industries. (<http://www.bls.gov/iif/oshstate.htm#ky>)

Underground mining is dangerous, primarily because we use large pieces of equipment in confined spaces, but like other businesses, we have made dramatic improvements in safety over the past 30 years. To constantly label the coal industry as unsafe is grossly unfair to the many hard-working individuals who pride themselves in this industry. Just look for references in the newspaper when a construction worker or farmer dies at work. Compare that to notices of a coal miner killed on the job. You will soon see the bias shown against coal.

Environment. There is no level land outside the floodplain in Appalachia that was not created by man. I argue for level land in the mountains because I truly believe this land will make those areas the economic centers of Appalachia in

the next 100 to 200 years. The first question by a landowner when asked about mining his property is, "Will you leave me some level land?" These areas of level land will sustain a viable economy in the region long after coal is gone.

What most people fail to realize is that only a small percentage of Appalachia's coal fields – less than seven percent – will ever be impacted by mountaintop mining. Because of the Environmental Protection Agency's (EPA) requirement to minimize fills, you are seeing very little mountaintop removal today. The mountains are being reshaped back into mountains after mining. Because of the swell factor when land is disturbed, we must place excess rock and dirt in head-of-hollow fills. Biologists call these areas "streams." Engineers, and most people with common sense, call them dry ditches.

These "streams" are not destroyed; they are reconstructed. Once they have had a chance to revegetate, these "streams" look and function like they did prior to mining. Reclamation of the land does not occur overnight. It takes several years for reclamation to mature. In our age of instantaneous gratification, most people do not have the vision to see how a reclaimed area will mature and function long after the coal is gone.

Economy. The Kentucky coal industry employs over 17,000 miners at an average annual wage of \$47,000. An estimated 50,000 additional workers have jobs indirectly related to mining: equipment suppliers, electric utilities, repairmen, engineers, accountants, truckers and the majority of people who live and work in the coal-rich areas of our state.

It is said that coal creates poverty. A \$47,000 a year job does not create poverty. It's the lack of jobs that creates poverty!



Of the 120 million tons of coal produced annually in Kentucky, 70 percent is exported, bringing \$3.5 billion into Kentucky. Around 85 cents on each dollar stays here – wages, benefits, operating expenses, royalties and taxes. In addition to the normal business taxes, coal contributes over \$230 million annually in coal severance tax revenues to the state and coal field economies.

Coal generates more than half of the nation's electricity and 91% of Kentucky's electricity.

Global warming. Is the climate warming? Yes, but many questions are still subject to scientific debate, and there is disagreement worldwide about what's going on. We can't accurately predict weather more than four days in advance, and yet we're relying on computer models that predict dire consequences due to global warming in the next 50 to 100 years?

When you hear talk about CO₂'s influence on global warming, what they don't tell you is that carbon dioxide only makes up 0.054 percent of the atmosphere (yes, well less than 1%). It is a very minor greenhouse gas. Ninety-five percent (95%) of the greenhouse effect comes from water vapor in the atmosphere.

What is driving the earth's climate? A very strong case can be made for the sun. A history of solar activity relates directly to earth's temperature record. One theory is energy from the sun is instrumental in the formation of clouds, and clouds are instrumental in the earth's temperature.

Many of you may remember, back in the 1970s, when the media predicted another ice age. Remember the scares that resulted

when Alar, saccharin, Red Dye #2, a hole in the ozone layer, electric power lines and cell phones were all reported to be causing cancer epidemics, and that Y2K would shut down the nation's electric grid and financial institutions?

Most of us understand these stories are exaggerated. Most understand the need of the press to sensationalize issues, to help in selling their stories. Unfortunately, the only science driving the global warming issue is "political" science.

Need for domestic fuels. We desperately need to wean ourselves from imported foreign oil, both for our national security and our economic security. Our country imports way too much oil (62 percent), much of it from countries unfriendly to America, including Venezuela, Saudi Arabia, Iraq and Algeria. And we are increasingly spending more for a gallon of gas.

Imported oil comes to us at a staggering price – over \$60 a barrel. The Department of Energy statistics on imports show we're importing over 14,000,000 barrels of crude oil a day! That's over \$840,000,000 paid each day to foreign countries! Just think of the economic growth this sum could generate here in America. Think of the jobs that can be created in Kentucky and in this country.

The total amount of imported oil America consumes cannot be replaced by any one alternative fuel source. To wean ourselves from such staggering oil imports, we must do multiple things: conservation, improvements in fuel efficiency, biomass-to-liquids (ethanol, bio-diesel, and cellulosic ethanol), coal-to-liquids and increasing domestic oil drilling. No one alternative can, by itself, come close to solving our problem. Even if we cannot

totally replace all imports, the availability of more domestic fuels would help insulate us from spikes in oil prices and enhance our national security.

Coal-to-liquid (CTL) fuel is a proven technology. Germany fueled its war machine during World War II on liquid coal, and South Africa currently generates a third of its fuel needs from coal. Why has a commercial-size CTL plant not been built in America? Because the price of imported oil dropped below the break-even price (\$50 per barrel) for CTL. What investor would risk \$3 billion to build a plant, only to have the OPEC countries drop their prices just long enough to bankrupt the plant, and then resume their price gouging? It is critical to have price guarantees to ensure a CTL plant can be built successfully.

Did you know that fuel can be produced from coal that would sell for \$1.50 per gallon, plus taxes? That is a pretty good deal from a product (coal) that only costs two cents a pound.

We need real-world solutions to real problems – not empty criticism. We should recognize coal for what it can contribute to America's energy security and independence from foreign imports. It's time we use more of our most abundant fuel, and tell OPEC to keep more of theirs.

Coal is our bridge to America's energy future. But until that day, coal will remain America's silent workhorse, providing cheap, dependable electricity. Coal: Energy for America! ♾



Coalbed Methane as a Resource for the Future: Impediments and Advantages

J. Thomas Lane

Bowles Rice McDavid Graff & Love LLP

Tom Lane is a partner in the Bowles Rice Charleston office. He is a member of the firm's Executive Committee and the Energy, Environment and Regulatory Practice Group. He practices primarily in the areas of natural resources, coal, oil and gas, commercial real estate, zoning and land development, as well as litigation cases involving these areas. He also engages in lobbying and government relations, particularly on issues affecting the mineral industry.

As the Robert T. Donley Adjunct Professor of Law at the West Virginia University College of Law, Mr. Lane teaches a course in Coal, Oil and Gas Law. He has compiled a teaching text on coal, oil and gas and has published numerous articles.

Mr. Lane is President of the Charleston City Council, where he has been an elected member since 1987.

Mr. Lane is trustee and past president of the Energy and Mineral Law Foundation and past president and chairman of the Executive Council of The West Virginia Bar Association. He is also the chairman of the Charleston Land Trust.

Mr. Lane received his bachelor of arts degree in 1968 from Washington & Jefferson College and his law degree in 1973 from West Virginia University.

In 2006, Mr. Lane was awarded the annual McClaugherty Award by the Energy and Mineral Law Foundation for distinguished service to the natural resource profession.

In 1978, Mary Cunningham drilled a well 800 feet deep into the Pittsburgh seam of coal in order to develop the coalbed methane from land in Greene County, Pennsylvania. The operations contemplated that the coal seam would be stimulated by hydro fracturing, a process which injects water under extreme pressure to enhance production of the gas. Horrified by the potential damage this process could have to its coal seam, United States Steel Corporation instituted litigation to stop the development.

Ownership of the coal in question had been severed from the remaining ownership interests in the land many years prior to this development. The ultimate issue in U.S. Steel's case was whether the landowner or coal owner could develop this resource, and indeed, the question was unique because it had never been previously raised in any reported case in the United States or England. This was so despite common knowledge that most coal seams contain gas, and throughout the history of mining, coalbed methane was seen as a dangerous waste product.

The case was litigated through the Pennsylvania court system and ultimately reached the Supreme Court of Pennsylvania, where the Court held that coalbed methane is owned by the owner of the coal seam, so long as it remains in the coal seam. The decision reverberated throughout the industry and the ensuing legal commentary was voluminous.

Severed ownership, like the Pennsylvania land, is common throughout mineral producing areas in Pennsylvania, West Virginia and practically all surrounding eastern states. Part of the consternation in the case was that parties to deeds which severed coal and mineral ownership from the remainder of the land virtually never addressed the ownership of coalbed methane. Thus, despite the most sophisticated endeavors

by the best lawyers throughout the country, virtually none addressed the issue of this ownership. Accordingly, the Pennsylvania decision has spawned litigation that has spread to many states, and the results are highly inconsistent and indefinite.

Despite the legal question of ownership, extensive development of coalbed methane has occurred in the ensuing years. The advantages of coalbed methane wells are that drilling is relatively shallow, new techniques have been developed for horizontal drilling, the development of coalbed methane degasifies coal seams, making coal mining safer, and perhaps most importantly, there has been, and will continue to be, an ever-increasing need for all energy resources. In many instances the development of coalbed methane is taking place in connection with coal mining operations so that the methane development takes place in advance of coal mining, and the development of coalbed methane serves to degasify the seams, making mining safer. Significantly, a product which historically was, and which remains, one of the greatest dangers to coal mining, has been turned in many cases from a waste product vented to the atmosphere to a valuable resource.

Generally, coalbed methane has a lower btu value, or heating content, than natural gas and often coal seams which are filled with water must be de-watered in order to produce coalbed methane. This de-watering process adds to the expense of development. Additionally, coalbed methane does not normally exist under high pressure as does natural gas, and in order to aid in the development of coalbed methane, compressors and other facilities become necessary. Thus, while the cost of drilling coalbed methane wells may be less than natural gas wells, the cost of operations is higher.

Central Appalachian Basin Coalbed Methane Fields



Map courtesy of Marshall Miller & Associates, Inc.

Significant portions of southern West Virginia and southwest Virginia have been developed for coalbed methane so that it has become a significant resource. The potential exists for much greater development. Notably, the West Virginia legislature enacted legislation in the early 1990s to regulate and facilitate coalbed methane. The success of this legislation, the growing demand for energy resources and the development of new technologies assure that we will see development of coalbed methane grow in years to come. ▽



Coalbed Methane Lab (photo courtesy of Marshall Miller & Associates, Inc.)



What Does Clean Coal Technology Mean to West Virginia?

Stephanie R. Timmermeyer, Secretary
West Virginia Department of Environmental Protection

Stephanie Timmermeyer, Cabinet Secretary for the West Virginia Department of Environmental Protection, brings a wide variety of experience to the top regulatory post.

After serving more than a year as the DEP's Division of Air Quality director, former Governor Bob Wise appointed Ms. Timmermeyer as Cabinet Secretary in March 2003. Governor Manchin then appointed Ms. Timmermeyer for a second term as Cabinet Secretary in January 2005.

Before her career at DEP began, Ms. Timmermeyer worked as an attorney in Charleston, West Virginia.

Ms. Timmermeyer's law degree is from the West Virginia University College of Law, where she graduated in the top 10 percent of her class. While there, she served as the National Coal Issue Editor on Law Review.

Prior to law school, Ms. Timmermeyer worked as a forester for a public utility and as an environmental consultant.

She graduated from West Virginia University with a Bachelor of Science degree in forestry and received a Masters of Science degree in environmental science from Marshall University.

The answer to this important question begs the answer to a more basic one: What is clean coal technology? The phrase "clean coal" has an elusive definition. Many claim it is an oxymoron, suggesting that coal can never be clean. These skeptics urge that "clean coal" is actually just a "greenwash buzzword" and an attempt by the coal industry to stay alive in a world where renewable energy is becoming more relevant and even a requirement in some states. They argue that coal is dirty to mine, wash, transport and burn. Some define clean coal technology by pointing to air emission control technologies already discovered and implemented, such as scrubbers which remove

sulfur dioxide and selective catalytic reduction systems (SCRs) which remove nitrogen oxides. Still others define "clean coal" as the pursuit of something yet discovered or invented.

So who is right? The phrase "clean coal technology" is bandied about frequently by engineers, bureaucrats and politicians as the answer to our nation's energy future. But without a generally accepted definition, how can the average person understand why millions of dollars are being spent on it? More importantly, how does a state such as West Virginia, that depends heavily on coal for its economic stability, position itself to take advantage of those dollars



and not only establish a leadership role in technology development, but also make an easier transition away from its historical dependence on the resource?

A good place to start understanding the terminology is the United States Department of Energy (DOE), which houses the President's Clean Coal Power Initiative. DOE defines clean coal technology as "a new generation of energy processes that sharply reduce air emissions and other pollutants from coal-burning power plants." There are many successes DOE can point to, the most basic of which is coal washing – a standard practice that reduces emissions of ash and sulfur dioxide when the coal is burned. More recent technologies, such as air pollution control devices, were developed within the past 15 years to address acid rain and the formation of ozone. All agree that the burning of coal has become considerably cleaner. But new issues, including the health impacts of mercury and particulate fines, are keeping engineers at the drawing board. Fortunately, researchers have discovered a co-benefit to the installation of scrubbers and SCRs. Through the installation of appropriate equipment, mercury can be removed by at least 80 percent from the gas stream.

Currently, U.S. Environmental Protection Agency (EPA) standards seem to drive the development and deployment of new clean coal technologies. When the Acid Rain Program and the Nitrogen Oxide State Implementation Plan Call were promulgated, many companies moved forward with the installation of scrubbers and/or SCRs on their West Virginia plants. With the discovery of the co-benefit of both types of controls, and facing a pending cap-and-trade mercury program from EPA, many power plants proceeded to install both systems. There are 16 plants in West Virginia with a total of 37 electric generating units. Nineteen of those units have installed or are planning to install dual controls. West Virginia will benefit from these decisions for years to come with better air quality and the economic investment.

Facilities are now facing possible EPA regulation of greenhouse gas emissions and an even stricter ozone standard of 70 to 75 parts per billion based on new health studies. This will likely spur even more development of the next generation of clean coal technology, which will likely be a combination of coal gasification – which has the ability to produce near zero conventional pollutant emissions – and carbon dioxide capture.



Coal gasification technology, often referred to as Integrated Gasification Combined Cycle (IGCC), is the process of gasifying coal to produce electricity. The coal is gasified by burning finely-crushed coal in an environment with less than half the amount of oxygen needed to fully burn the coal. Essentially, the coal is not burned directly but undergoes a reaction with oxygen and steam. This produces what is known as synthetic gas or "syngas." This gas is then combusted in a combined cycle generator to produce electricity. "Combined cycle" refers to the waste heat remaining after the gas is combusted and captured to produce steam and generate additional electricity. The advantage of IGCC technology is that it creates a separate gas stream of carbon dioxide; thus, the carbon dioxide is able to be readily removed. In traditional coal-burning units, the process of separating the carbon dioxide gas stream is cost-prohibitive.

However, removal of the carbon dioxide once it is separated raises a new question: what to do with it? Known as carbon capture and storage (CCS), the current

options include pumping the carbon dioxide into mined-out coal seams, saline aquifers or oil fields. Pumping the gas into coal seams provides the possible benefit of displacing coalbed methane, which may then be captured and used as a fuel. Similarly, pumping carbon dioxide into oil fields enhances oil recovery by supplementing pressure. While there have been many pilot projects involving CCS, the technology is still emerging and is not yet being used on a commercial basis.

Clearly, the business of burning coal has become cleaner over the years, and there are excellent prospects on the horizon for coal combustion to result in near-zero emissions. While great strides have been made in air quality solutions, there remain concerns from critics that focusing clean coal technology on only the combustion side is deficient because it does not address the environmental effects of the mining of the resource.

While funding for clean coal technology does not include consideration of the environmental effects of extraction, environmental regulatory programs have gradually improved over time to address this issue. As monitoring and modeling technology have developed to better predict the effects of extraction, these programs have changed to better minimize the environmental impacts of coal mining. In West Virginia, rules were recently promulgated to require a Surface Water Runoff Analysis (SWROA), tighter contemporaneous reclamation, especially of valley fills, and to encourage more sites to utilize the forestry reclamation approach (FRA).

The SWROA is a decision-making tool to determine whether a mining operation will increase the potential of an area to flood during mining and after mining is completed. Complex modeling, which includes meteorology data and terrain data, is used in making the assessment. The FRA allows for a more productive post-mining land use by emphasizing the benefits of tree planting in areas where development is not feasible.

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Recent Mountaintop Mining Decisions Reaffirm Importance of Initial Permitting Process

Joseph M. Dawley

Bowles Rice McDavid Graff & Love LLP

Joe Dawley is special counsel in the Morgantown office of Bowles Rice, and practices in the areas of environmental law and government relations.

Mr. Dawley's prior legal experience includes representation of commercial and industrial clients in permitting, compliance and enforcement matters under state and federal environmental laws.

Mr. Dawley also is a licensed Professional Engineer. Previously, he worked as a project manager for an international corporation, and a process engineer for a company developing an innovative hazardous waste treatment technologies for the Environmental Protection Agency's Office of Research and Development.

Mr. Dawley previously served as general counsel for the West Virginia Department of Environmental Protection. He provided the cabinet secretary and WV DEP division directors with legal and policy counsel on program development and implementation, compliance and enforcement issues.

Mr. Dawley is a member of the Advisory Board for the Northern West Virginia Brownfields Assistance Center and is the secretary of the West Virginia Chapter of the Allegheny Mountain Section of the Air and Waste Management Association.

He received his B.S. degree in chemical engineering from Syracuse University and received his law degree from Lewis and Clark College's School of Law. Mr. Dawley is a licensed Professional Engineer in West Virginia, Virginia and Oregon.

Regulatory uncertainty is the Achilles heel of a business's ability to plan and invest in its operations, its employees and the communities in which it conducts its operations. Apart from the pure existence of governmental regulations, regulatory uncertainty is a result of unclear policies, scientific uncertainty and inadequate governmental resources. However, because the root causes – and there are many – of regulatory uncertainty are moving targets, a business' ability to navigate through the regulatory process can be challenging despite one's best efforts to ensure compliance with the law. Two recent decisions on mountaintop mining practices by the United State's District Court for the Southern District of West Virginia (Southern District) highlight how regulatory uncertainty continues to plague the mining industry in West Virginia. This article provides a brief summary of the decisions, describes how the court reviews agency decisions and outlines a strategy for ensuring that agency decisions will withstand judicial scrutiny.

The decisions stem from environmental organizations' challenges to permitting decisions by the United States Army Corps of Engineers (the Corps), authorizing valley fills associated with mountaintop mining operations. While the West Virginia Department of Environmental Protection is primarily responsible for regulating surface mining activities through the issuance of surface mining permits, the Corps plays an indirect but important role in regulating the impact that surface mining has on surface waters, pursuant to Section 404 of the Clean Water Act. Specifically, the construction of valley fills, through the placement of overburden in valleys that contain intermittent and ephemeral streams, requires a Section 404 permit that is issued by the Corps (Fill Permit).

On March 23, 2007, the Southern District ruled that the Corps failed to comply with the

Clean Water Act (CWA) and the National Environmental Policy Act (NEPA) when the Corps issued Fill Permits for several valley fill activities, and issued findings that the valley fills would cause no significant impact to the environment ("finding of no significant impact" or FONSI), thereby eliminating the need to perform an environmental impact statement (EIS) under NEPA. *Ohio Valley Environmental Coalition v. United States Army Corps of Engineers, Civil Action 3:05-0784 (OVEC I)*. Specifically, the Southern District agreed with the plaintiffs' allegations that the Corps: (1) did not fully assess whether the permitted valley fills will cause a significant impact to the aquatic resources of headwater streams as required by the CWA or a significant effect on the environment as required by NEPA; (2) impermissibly limited the scope of its NEPA environmental assessment; and (3) failed to consider the cumulative effects of the fill activities on the aquatic resources and the environment.

To its defense, the Corps performed an impact analysis, but due to the scientific and financial limitations that the Corps faced in evaluating the various aquatic and ecological effects of the valley fills, the Corps applied its best professional judgment to conclude that the valley fills would not result in a significant impact. To make up for its lack of knowledge on the degree of impacts caused by the valley fills, the Corps imposed mitigation requirements to offset the aquatic and ecological impacts caused by the valley fills. In holding that the Corps improperly issued the permits, the Southern District remanded the permits to the Corps for reconsideration.

On June 13, 2007, the Southern District ruled that stream segments above in-stream sediment ponds constructed at the base of valley fills are waters of the United States and thus, discharges of sediment laden waters from the face of the



valley fills are subject to the permitting requirements under Section 402 of the Clean Water Act (Discharge Permit). *Ohio Valley Environmental Coalition et al. v. United States Army Corps of Engineers, et al., Civil Action No. 3:05-0784 (June 13, 2007) (OVEC II)*. The in-stream impoundments are constructed at the base of valley fills through the issuance of a Fill Permit by the Corps, and serve as settling basins for sediment-laden water that is discharged from the base of the valley fill. While the CWA requires a Discharge Permit for any discharge of pollutants, such as sediments, into a water of the United States, the Corps reasoned that the water behind an embankment constructed in a water of the United States pursuant to a Fill Permit is no longer a water of the United States because the impounded water is excluded from the regulatory definition of water of the United States under a provision called the “waste treatment exclusion.” The Southern District rejected this argument in concluding that the waste treatment system exclusion does not apply to in-stream waste treatment systems that are constructed in waters that are within the regulatory definition of waters of the United States.

Both *OVEC I* and *OVEC II* highlight the role that the Court plays in reviewing an agency’s decision and demonstrate

the significance of the agency’s decision-making process, as opposed to the agency’s final decision. Under doctrines of administrative law, courts are deferential to the decisions of expert agencies and thus the Court grants agency decisions great weight, unless the decision is legally flawed or not supported by the facts.

In examining the Corps’ decision-making process in *OVEC I*, the Southern District concluded that in performing its aquatic and environmental assessments under the CWA and NEPA, the Corps failed to take “a hard look at the evidence and explain its decision on an objective or scientific basis to provide a reasoned basis for its conclusions.” Similarly, in *OVEC II*, the Southern District concluded that the Corps’ interpretation of the waste treatment exclusion provision was entitled to no deference because the Corps was unable to provide a reasoned basis to show that its interpretation reflects its “fair and considered judgment on the matter.”

The Southern District also rejected the Corps’ reliance on a 2006 EPA interpretation that supported the Corps’ position that the waste treatment exclusion applies, on the grounds that the EPA’s interpretation also lacked reasoned analysis to demonstrate that it was entitled to deference. Without any guidance from

the expert regulatory agency, the Southern District adopted the Fourth Circuit’s 1991 decision that the waste treatment system exclusion does not apply to in-stream waste treatment systems that are constructed in waters that are within the regulatory definition of waters of the United States.

In light of the scrutiny that agency decisions face when reviewed by the Court, the permitting decision is not necessarily the end game when it comes to mining permits. Equally important is a defensible record that supports the permitting decision. Therefore, mining operators should fully understand the legal requirements that an agency must satisfy when issuing a permit, and take a proactive role in the permitting process by providing the agency with the necessary facts and information to support the regulatory findings. More importantly, applicants should be mindful of the limitations associated with decisions that are not supported by the facts and political solutions, as they undermine the legal basis for the permitting decision. While this approach may add time and expense to the permitting process, it should help to produce a defensible permit, which is the ultimate objective of the permitting process. ▽



Generating Electricity in a Carbon-Constrained World

Dana E. Waldo, President & CEO
Appalachian Power

Dana Waldo is president and chief operating officer for Appalachian Power, serving approximately one million customers in West Virginia, Virginia and Tennessee.

Mr. Waldo was previously president and CEO of the West Virginia Roundtable, a private, non-profit, non-partisan association whose members include the chief executive officers of West Virginia's leading business, education and economic development organizations.

Prior to joining the Roundtable, Mr. Waldo was AEP's state president in West Virginia. With AEP for 25 years, he held various accounting, financial forecasting and operational positions.

Mr. Waldo has served on the board of directors of Advantage Valley, the Business and Industrial Development Corporation of Kanawha Valley, the West Virginia Chamber of Commerce and the West Virginia Manufacturers Association. In 1998, Governor Underwood appointed him to the West Virginia Council for Community and Economic Development.

Mr. Waldo received a bachelor's degree in Business Administration/Accounting from Franklin University and earned an MBA from Ohio University. He also attended management development programs at the Ohio State University and the University of Virginia's Darden Graduate School of Business Administration.

Appalachian Power, like all public utilities, operates under the authority of state certifications that grant it exclusive provider rights within a defined franchise service area. These certifications legally obligate the company to provide safe, adequate and reliable service at regulated prices to all customers within that service area. In return, the company is given an opportunity to earn a reasonable return on its prudently incurred investments: an arrangement typically referred to as the regulatory compact.

A fundamental aspect of the compact is the requirement that Appalachian provide its customers with service at the time they need it, now and in the future. Said another way: When our customers flip a switch, they expect the lights to come on.

In order to meet this expectation, Appalachian must have the necessary infrastructure in place at the moment of customer demand, since electricity is generated and used instantaneously. Consequently, our planning horizon for designing, permitting and constructing major elements of our infrastructure, like power generating plants and high voltage transmission lines, is measured in terms of decades.

Our process to forecast customer demand, evaluate engineering options and undertake subsequent building programs must start well before every last fact and nuance about significant policy issues like the Clean Air Act are known. Such is the case today with respect to the policy issues of global climate change, greenhouse gas emissions and carbon dioxide limits.

Between 2002 and 2025, it is estimated that the nation's demand for electricity will require 335 gigawatts of new generating capacity; an amount equal to the nation's current coal-fired capacity.

Investment decisions about building new capacity must consider the likelihood of future carbon dioxide (CO₂) emission limits.

Little wonder that one of the biggest questions facing the nation's energy and electric utility industries is not if GHG regulation will occur, but when and in what form. The critical follow up question: How will CO₂ reductions be accomplished?

GHG policy initiatives are forming across the nation, including the West Virginia Legislature's passage of SB 337 to begin a statewide GHG registration and reporting process.

The policy debate is also active on Capitol Hill. House Energy and Commerce Chairman John Dingell (D-MI) recently stated that he thinks his committee will have to adopt a cap-and-trade system or some form of carbon emission fees to reduce GHG emissions.

AEP, Appalachian's parent company, is one of the largest electric utilities in the United States and the largest user of coal in the western hemisphere, consuming about 75 million tons a year. We understand that our operations have enormous economic, environmental and social impacts. As such, we are committed to reducing our GHG emissions and supporting reasonable approaches to carbon control, such as those offered by Senators Bingaman (D-N.M.) and Specter (R-Pa.).

Low Carbon Economy Act of 2007

The Senators propose an economy-wide cap-and-trade program to limit GHG emissions. The program, which would start in 2012, provides for allowances to be allocated to various industry sectors and to the states, and then to be auctioned and set aside for certain purposes.

The bill includes a crucial proposal that makes this the first climate legislation with a mechanism to hold major U.S. trading partners accountable to reduce GHG emissions. Any mandatory national GHG emissions cap-and-trade program must ensure that emissions from China, India and other developing nations do not undermine America's effort to address climate change, while also adhering to its World Trade Organization obligations.

Starting no later than 2019, the President must determine whether certain foreign countries have taken "comparable action" to limit their GHG emissions. If the President determines that a major trading partner is not taking comparable action, the President will require that GHG-intensive imports from those countries carry allowances purchased from an "international reserve allowance" pool. Starting in 2020, importers of certain GHG-intensive goods from these covered countries are required to make a written declaration that their goods are accompanied by a sufficient number of international reserve allowances.

Some other key points of the bill:

- The GHG emissions cap starts at 2012 levels, gradually declines to 2006 emissions levels by 2020, and requires steeper reductions (1990 levels) by 2030.
- Compliance costs are limited through a safety valve for purchasing allowances that starts at \$12 per metric ton and increases 5 percent above inflation each year.
- Bonus allowances are provided for carbon capture and storage projects undertaken at new or existing power plants.

AEP recognized long ago that the emissions, including GHG, of its coal-fired fleet of power plants would have a significant impact on the future of the company. Instead of waiting for regulations to force a response, the

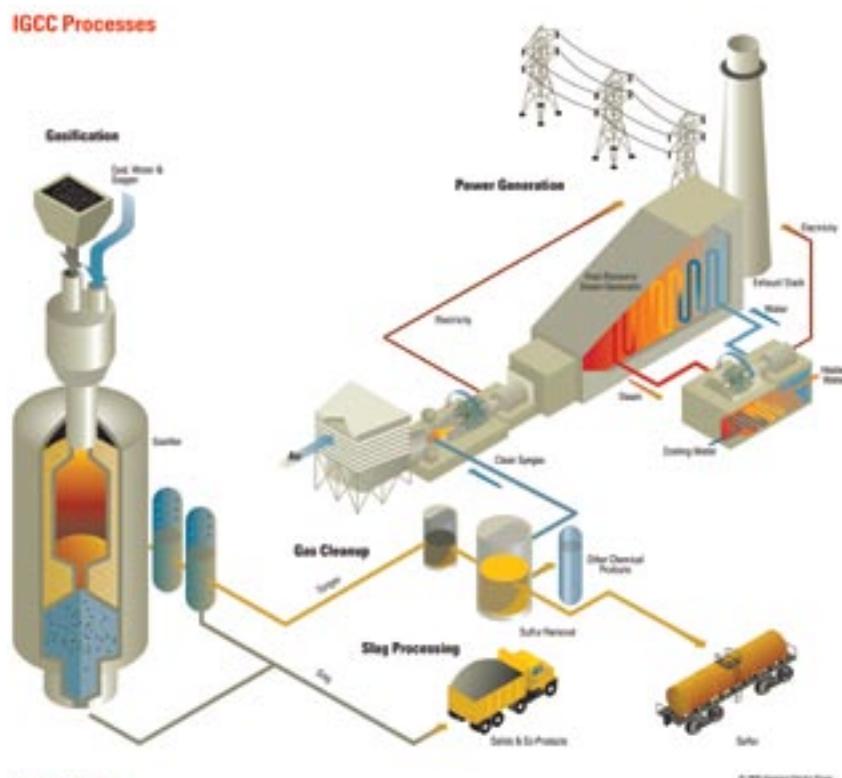
company began proactively addressing this challenge with innovative, first-of-a-kind approaches designed to allow the continued use of coal to generate electricity in a carbon-constrained world.

Integrated Gasification Combined Cycle

In August 2004, AEP was the first company to announce plans to scale up Integrated Gasification Combined Cycle (IGCC) technology to build baseload, coal-fired power plants. Appalachian recently filed applications with the Public Service Commission of West Virginia and the Virginia State Corporation Commission seeking regulatory approval to build a 629 MW IGCC plant adjacent to our Mountaineer Plant near New Haven, West Virginia.

IGCC is a clean coal technology that combines two technologies – coal gasification and combined cycle power generation – to offer the benefits of a low cost fuel with superior thermal and environmental performance. The IGCC process uses a gasifier in which coal or other fuels are partially combusted with oxygen and steam to form what is commonly called "syngas" – a combination of carbon monoxide, CO₂ and hydrogen. The syngas then is cleaned to remove the particulate and sulfur compounds. Coal gasification allows the removal of contaminants before the coal gas is combusted, as opposed to installing costly controls that capture emissions from the exhaust gas stream.

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Quick Facts

Location: AEP is pursuing two AEP-owned sites for an IGCC plant

- Mason County, W.Va., adjacent to AEP's Mountaineer Plant; and
- Meigs County, Ohio, in the Great Bend area.

Capacity: 629 megawatts—per unit

Timeline/Costs: The IGCC clean-coal power plant proposed in New Haven, West Virginia, could be completed in mid-2012 at the earliest at a cost of approximately \$2.23 billion if appropriate regulatory approvals are obtained in West Virginia and Virginia without delays.

Jobs: Construction jobs, required from all building trades, are expected to peak at about 1,400 jobs. On a permanent basis, about 125 employees will be needed to operate the plant.

Coal use: 1.5 million to 2 million tons per year.





The Critical Path for a Coal-Fired Power Plant: The Air Permit

Thomas W. Wheble, Project Manager
Longview Power, LLC

Tom Wheble is a Project Manager with Longview Power, LLC. Mr. Wheble has over 20 years of experience in the engineering, operation and maintenance of a variety of power plants, both nuclear and fossil-fueled. Mr. Wheble is currently working on the development of the 695 MW GenPower plant, near Morgantown, West Virginia.

Mr. Wheble's responsibilities include land purchases, coordination of environmental permitting activities, technology review and selection of plant equipment, including boiler, steam turbine and emission control equipment.

Previously, he managed all technical procurement activity for a 670 MW nuclear power plant in Plymouth, Massachusetts. In addition, he was responsible for design and construction of waste water treatment facility at a nuclear power facility in Florida.

He has a B.S. in Engineering from Massachusetts Maritime Academy and an M.S. from Lesley University.

The development of a new coal-fired power plant will be dominated by one issue – the air permit. It is the permit which will be the hardest to obtain, and likely subject to the most challenges. In addition, the long time periods involved in the permitting process, and subsequent appeals of the permit issuance, continue to keep the air permit at risk as the project moves forward.

The Longview Power, LLC project in Monongalia County is an example of this. Longview made its application for an air pollution control permit to the West Virginia Department of Environmental Protection Division of Air Quality on August 15, 2002. The permit was issued on March 2, 2004. The last challenge to this permit, a collateral attack in federal court, was dismissed on June 27, 2007 – almost five years after Longview submitted the application.

In addition to the long period of agency consideration and appeal, it will take nine to twelve months to prepare the permit application. Assembling the permit information, doing the computer modeling and putting together the permit application is time-consuming, detail-oriented work. Since any resulting permit will likely be challenged, reviewing and proofing the application before submittal also is important.

Selection of Technology

A critical project decision is the selection of technology. There are a variety of considerations in making this decision: legal, practical and economic. The legal considerations revolve around the requirement that the technology must be the Best Available Control Technology (BACT). The practical considerations include whether the technology will actually be available from builders and suppliers on schedule, and whether the builders and suppliers guarantee

that the plant will produce the projected output and meet the emissions limits. Finally, can the technology meet the project's economic needs? All of these considerations will be reflected in the air permit.

One of the most hotly debated questions in permitting a new coal-fired power plant is whether Integrated Gasification Combined Cycle (IGCC) is the Best Available Control Technology. Longview did not propose to use IGCC. Longview proposed a pulverized coal supercritical boiler with once through balance draft, single reheat steam turbine generator burning 2.5% bituminous coal. The West Virginia Department of Environmental Protection Division of Air Quality agreed that IGCC was not BACT. In over-simplified terms, BACT involves setting an emission limitation by considering the energy, environmental and economic impacts achievable through the application of available technologies.

The principal concern with IGCC during the Longview permitting process was whether IGCC was actually available as a commercially viable technology. To be commercially viable, among other things, a technology must be reliable, able to achieve the emission limitations and have suppliers willing to guarantee certain levels of performance. IGCC technology continues to advance. American Electric Power is proposing to use IGCC in some new projects it is working on.

Importance of Negotiation

One aspect of air permitting that is overlooked is the need to negotiate not only with the permit-issuing agency and the United States Environmental Protection Agency, but with other potentially affected parties. These parties include other government agencies such as the Federal Land Managers and the National Park



A rendering of Longview Power's 695 MW plant, currently under construction in Monongalia County, West Virginia.

Service. They also include environmental organizations such as the Sierra Club, the National Parks Service and Trout Unlimited. These groups have similar, but certainly not identical, interests.

The Federal Land Managers have a formal role in air permits such as that sought by Longview. Early consultation with them and with other potentially affected federal and state agencies is very desirable. A dialogue presents the best chance of resolving agency concerns. Projects should not lose sight, however, of the fact that the agency actually issuing the permit is the decision maker.

A more debatable question is when and how to negotiate with the traditional environmental groups such as Sierra Club and Trout Unlimited. Equally debatable is whether to negotiate with ad hoc local

groups which oppose the project. Each situation will, of course, depend on its own merits. Practically, it may not be possible to negotiate air permit terms with a local ad hoc group. Often such groups are simply opposed to the project and have no interest in resolving the air permitting issues. More traditional environmental groups often are willing to negotiate specific issues and to resolve them.

With more traditional environmental groups, the question is *when* to negotiate with them. There are several possible times: immediately after the permit is filed, after a draft permit is issued or after a permit appeal is filed. Factors which influence the choice include whether any relationship has been established with the groups, the reaction of the permit agency to such negotiations and the circumstances of the project.

Appeals of air permits are to be expected. Negotiations may resolve appeals or eliminate the need for appeals by some interest groups, but there is still a probability that appeals by groups which are interested only in stopping the project will occur. All a project can do with appeals is to push hard to have them resolved as promptly as possible. Even then, years will go by as they are resolved.

A successful air permitting experience requires attention to detail, perseverance and flexibility. It also requires the willingness to move a project forward even in the face of uncertainty about the ultimate outcome of the permit issuance, the negotiations and the appeals. ▽



The Role of Developer's Counsel in Energy Projects

Leonard B. Knee

Bowles Rice McDavid Graff & Love LLP

Leonard Knee is a partner in the Charleston office of Bowles Rice, and concentrates his practice in environmental law and public utility law. His substantial experience encompasses all facets of environmental law and litigation.

A former Deputy Attorney General with the Environmental Task Force, he entered the private practice of law in 1985. Mr. Knee's litigation experience includes mines and quarrying, landfills and industrial facilities, as well as water pollution issues. Technically complex, these matters require an extensive understanding of geology, hydrology and chemistry.

He has participated in the defense of a number of environmental criminal cases. Mr. Knee represents clients in civil litigation and handles a variety of administrative hearings before the Surface Mine Board, the Environmental Quality Board, Public Service Commission and the Air Quality Board. He regularly counsels clients about environmental issues associated with property transactions, and has advised clients about environmental compliance and conducted audits, both environmental and liability.

Mr. Knee earned a bachelor of arts degree in political science and a master's degree in public administration from West Virginia University. He received his law degree from West Virginia University College of Law. He was appointed by two former West Virginia governors to the Brownfields Task Force and the Energy Task Force.

Energy projects live and die at the intersection of politics, law and science. It is an intersection shrouded in fog, where the rules are constantly changing. It also is a place where unexpected and unanticipated events can materially advance or ruin a project. Successful navigation of this intersection requires flexibility, determination and planning. In navigating this intersection, the Developer's counsel has three roles: (1) management of legal issues; (2) participation in strategic decisions; and (3) coordination of activities between project components.

These roles are not mutually exclusive. In fulfilling these roles, Developer's counsel must (a) manage project documentation; (b) manage change; and (c) manage the politics.

Managing Project Documentation

The goal of Developer's counsel is to assemble the pieces of paper necessary for the project's construction and operation. These project documents are what a project developer must sell, as they are essential to obtaining project financing. The documents can be divided into the following categories:

- Deeds, options, rights of way, and other basic legal instruments necessary for the project;
- Permits and approvals from regulatory authorities for the construction and operation of the facility;
- Agreements to sell the power from the project; and
- Agreements to construct the project and to supply goods and services to the project.

Although assembling the project documents generally proceeds in the order listed above,

there is considerable overlap between the categories, and the categories are by no means rigid. Assembly of the project documents also requires a high level of coordination to maintain consistency in the documents. As the project progresses, coordination of the documents becomes harder and more critical. Changes which could have been accommodated easily in the beginning become difficult or even impossible towards the end of the process.

Managing Change

The key issue for project counsel is managing change. A cursory review of the life cycle of an energy project reveals that changes in politics, the applicable law and the science will inevitably occur in the years that it takes a project to get off the ground with the necessary approvals and agreements and reach conclusion. For example, an air pollution control permit might take a year to prepare and submit to the agency, a year for the agency to issue a final decision, and eighteen months for any appeals of the agency decision to be resolved. In such a time frame, political change is a given. As new administrations take office at all three levels of government, new priorities, new programs and new initiatives emerge. This, in turn, leads to new laws and regulations which a project will have to comply with. The changes may favor or hinder a project. Similarly, science does not stand still. New technology emerges rapidly, and even in the space of two or three years, new solutions often emerge which a project will want to use.

Equally important, the project itself will change. What was thought to be feasible will turn out not to be. The technology initially proposed will be superseded by another technology. Thus, revisions will be necessary.

How can change be managed? First, by recognizing that it will occur, second, by planning for it, and third, by managing it. The initial planning meeting must impress on the project group that change will occur, that everyone must promptly identify potential changes, and that there will come a point when even small changes will be very difficult to make.

Planning for change begins by identifying those project elements which will be most difficult to change as the project moves forward. These are typically the size of the project (both physically in the amount of land used and the size and location of project structures), the amount of power to be produced and the technology. These elements may include other things such as the time periods for ordering equipment. Preferably, these project elements should be reviewed every three months.

Once permits and other regulatory approvals are submitted, many project components become very difficult to change. The regulatory process expects to approve a specific “design.” If that “design” changes, then approvals previously obtained may have to be modified. Since a project typically requires multiple regulatory approvals, a change may require multiple modifications. This creates delay and more opportunity for challenges to project approvals.

Regulatory approvals should be done from a think-ahead perspective. That is, whenever options are possible, they should be included in the approvals sought. Project counsel must press the consultants and engineers to obtain the maximum degree of flexibility for the project. Where appropriate, requests to regulatory agencies should be for more than the anticipated need. Such a request might well avoid having to apply for a modification. And, given the crucial nature of the regulatory approvals, counsel must be intimately involved in the regulatory process.

The greatest risk of change is in the laws or regulations that the Project must comply with, and in the project itself. Project counsel must identify areas where regulatory changes may occur. This requires participation in significant and varied information gathering at the state and federal level. A specific program must be put in place to constantly review proposed changes and to participate in the regulatory process. Two focal points must always be kept in mind: additional cost to comply and additional time to obtain permits.

Managing Politics

Finally, participation in the political process is a necessity. Frequently, energy projects become politically controversial

regardless of the project’s intentions. The key here is to be politically savvy without Developer’s counsel appearing to be an overwhelming “political animal.” This entails a detailed knowledge of the key political figures, the political restraints, pressures on such figures and the evolving political landscape. Equally important is understanding the rationale and game plan of the project’s opponents and how to counteract it. Finally, Developer’s counsel must have a close ear to the ground and be able to immediately stop any developing misinformation about the project.

Conclusion

Energy projects are not for the faint of heart. They require the investment of years of effort and millions of dollars, with an uncertain outcome. They are complex and controversial. As America’s demand for energy grows, more and different kinds of energy projects will be proposed. The success or failure of these projects will, in large measure, depend on Developer counsel’s skill in navigating the maze through which the project must necessarily travel, and the changes that will inevitably occur. ▽

Bowles Rice attorneys and staff members were among those celebrating the May 2007 groundbreaking of Longview Power’s 695 MW plant near Morgantown, West Virginia. (left to right: Leonard Knee, Kim Parsons, Governor Joe Manchin, Tom Lane, Chud Dollison and Bob Dinsmore)





West Virginia: Wind Opportunities Abound

James M. Cookman, VP - Project Development
US Wind Force, LLC

Jim Cookman is the Vice President of Project Development for US Wind Force. He is responsible for development and permitting activities associated with wind energy projects in the Mid Atlantic Region. Mr. Cookman is a principle and member of the board of directors of US Wind Force, LLC, a wind energy development company established in 2001.

Prior to joining US Wind Force, he served as President and Chief Executive Officer of a family-owned independent insurance agency business. Mr. Cookman lives in Grant County and is an active member of the community. He is active in a number of social, service and fraternal organizations as well as serving on several for-profit and non-profit boards and commissions. Mr. Cookman is also involved in various political activities at both local and state levels. Formerly, he served as a member of the West Virginia Aeronautics Commission and the West Virginia Lottery Commission.

The State of West Virginia has reached a critical juncture on the issues of wind energy development. It can either fall prey to the whims of opponents who oppose this renewable energy source or, like many of our Mid-Atlantic neighbors, embrace the idea of using wind power to produce clean energy that reduces air pollution and emissions related to global warming while providing much-needed economic opportunities to rural West Virginia.

It has taken more than five years to reach this critical juncture. With several projects in the region moving forward, now is the time to take hold of this opportunity for our state.

Today, developers, communities and regulators are working together to improve siting procedures, protect our environment and gather crucial information about wind energy development. At the same time, the State is increasing tax revenue opportunities and improving its understanding of critical wildlife issues. The goal is to develop wind energy projects that maximize benefits and yet minimize impacts.

Nationally, the development and use of wind power is growing faster than ever and making a significant contribution to our regional and national demand for more domestic energy production. Last year, the United States generated enough electricity from wind to power more than one million average American homes. Wind-generated electricity reduces regional air pollution and emissions related to global warming. It also is a valuable component of our energy security, helping to reduce our nation's dependence on imported fuels and protect consumers from fuel price volatility.



Wind energy provides real benefits and economic opportunity for the nation as a whole as well as for small, rural communities in West Virginia that may not otherwise be able to attract manufacturing or new industries. Improving the local economic prosperity of counties in West Virginia must be a goal for all of us.

Wind projects generate jobs and clean power. The wind projects currently proposed in West Virginia would generate enough electricity for as much as 400,000 households. This reliable, diverse power source also can provide electricity for newly developed residential communities that want "green" power – a power that is critically needed for our growing economy, and most importantly, the next generation that will succeed us.

Because of the potential for jobs, West Virginia workers have been an outspoken voice of support for wind power. Good-paying jobs that build, maintain and operate these projects will help



put food on the table and send children to college for many of West Virginia's working families.

The wind energy industry also is addressing concerns about how wildlife interacts with wind turbines. Through collaborative approaches, such as the Bat Wind Energy Collaborative, scientists, wildlife experts and the wind industry continue to work together to learn more about interaction between bats and wind turbines in particular. This research will result in solutions that will allow bats and wind turbines to coexist. As for birds, the impact of wind projects is extremely low compared with other human-related activities. House cats, cars and plate glass windows kill more birds than wind turbines, at a rate of more than 10,000 to one.

While some opposition groups have expressed concerns about how wind energy development might affect property values, most studies to date, including an analysis from Marshall University, have

indicated that wind farms have no effect on property values. Circumstances in Tucker County, West Virginia seem to support this research. Local realtors and appraisers continue to cite only positive impacts of wind development, in terms of increasing home values and increased tourist interest in that area. Last year, the West Virginia Manufacturers Association conducted a poll of West Virginia residents regarding their attitudes toward wind power development in the state. More than 70 percent indicated support for wind energy. This is reflective of polls taken across the United States. Further, in Tucker County, where the state's only project has operated for more than three years, more than 86 percent supported wind development. This is a testament to the old adage, "If you build it, they will come."

It is human nature to harbor "Not-In-My-Back-Yard" feelings about every new development – especially when different people have different views of the aesthetic value of wind turbines. Many people feel

that they are elegant, peaceful and serene, often driving out of their way to see them. Others disagree. Personal taste certainly cannot be legislated; however, both views can be respected if the developments are constructed in a responsible manner. On whichever side of the fence one may sit, one thing is certain: wind energy can make a valuable contribution to the nation's economic, energy and environmental needs.

For West Virginia, the case is clear: wind power is technically and economically feasible. It produces useful amounts of electricity at reasonable prices with minimal environmental impact. It also provides a significant boost to the local economy during construction and contributes significant amounts of long-term tax revenue to local government during its useful life. For our future and for the future of our children, this new economic opportunity must become an important part of our state's clean energy future. ▽



Rocky Road to Energy Independence

W. Henry Harmon, President and CEO
Triana Energy, LLC

Henry Harmon is President and CEO of Triana Energy, LLC, and also is a private investor in a number of other energy related enterprises. He formerly was president of Columbia Natural Resources, one of the largest natural gas production companies in the eastern United States, before its sale to Chesapeake Energy in 2005. He also served as President and Director of Union Drilling, Inc. when it was the largest privately owned contract drilling company in the country.

Mr. Harmon holds a Bachelor of Science Degree from West Virginia University Institute of Technology, a Master of Science Degree in Management from The American College and a Ph.D. in Economics from The Union Institute in Cincinnati, Ohio. He also has earned the professional credentials of Certified Public Accountant and Certified Management Accountant and was recognized nationally in 2006 when inducted into the AICPA's Business and Industry Hall of Fame.

Mr. Harmon recently completed six years of service on the board of directors of the 5th District Federal Reserve Bank of Richmond. He continues to be active in a number of business, education and community organizations in the area, serving as trustee for The University of Charleston, chairman of The Greater Kanawha Valley Foundation, and trustee of the Triana Charitable Fund.

Call me Ishmael.

Just like the epic 1851 novel, *Moby Dick*, by Herman Melville, our country is navigating a turbulent sea on an uncertain odyssey, attempting to find our modern equivalent of the great white whale – energy independence. In generations past, the whale represented fuel and a source for all manner of feedstock with which to create things that sustain life; just as petroleum, coal, and natural gas do for us today. And while nearly everyone might agree that reaching energy independence would significantly change the world's political dynamic (and hopefully improve homeland security), the course to achieve this goal is as elusive as Melville's great whale.

Those of us who have struggled through recent decades to develop resources required to satisfy our collective appetite for energy have grown weary in many ways. Like Melville's characters, we struggle to deal with the social expectation of failure. Developing energy typically means placing at-risk significant amounts of money, dealing with the volatile cycles of commodity markets and then, if successful, being criticized for realizing the profit of our labors.

One generally unquestionable fact is that "low-cost energy available on demand" is considered a God-given right in the western world. The U.S. Energy Information Administration (EIA) reports that energy demand has grown, rather consistently, each of the past 26 years. The EIA also predicts the growth of demand for nearly all energy sources to continue at increasing rates through the year 2030; with demand for petroleum, coal and natural gas leading the way. ¹

But as companies strive to make energy products available to the hungry marketplace, they consistently face resistance from politicians, regulators, self-appointed guardians of the

environment, and a variety of celebrities whose access to the media somehow makes them expert on some very complicated issues. So while the market demands more, companies are restrained, taxed, penalized and vilified when they deliver. The absence of an accepted national energy policy and conflicting social and political agenda breeds the expectation of failure, because there is no definition of success that is not punished in some manner.

To continue the analogy, our conundrum is that the search for energy independence forces us to wrestle with the "great whale" of imbedded conflicts. While Ahab was a madman driven to dominate the world around him, he was mortally offended by the circumstances that had created him. Likewise, while the U.S. and European Union set goals and timelines for the creation of renewable energy sources, the OPEC nations threaten to disinvest of the development of new traditional energy sources needed to service demand during the transition. Minister Mohammed al-Hamli spoke recently at a conference hosted by Cambridge Energy Research Associates (CERA) in Turkey, indicating OPEC's intention is to invest \$630 billion in developing new traditional energy supplies by the year 2020. He also warned that OPEC governments would shy away from investing (or "wasting") money on such investments if they were unsure of the demand for the product. ² In other words, don't expect OPEC to help the West make an orderly transition to energy independence. If anything, markets could become dramatically more volatile as advances in renewables causes the dream of energy independence to come closer to reality.

Developing traditional resources is becoming more difficult for a number of reasons. First, the domestic oil and gas industry was gutted between 1985 and 2000 because of abnormally depressed



commodity prices. As a result, not enough attention has been put into exploration and discovery of new sources to develop. All this is complicated by the fact that advances in production techniques have resulted in faster recovery from new wells, meaning that we are depleting our reserves faster than ever.

Second, the cost of developing oil and gas projects has increased as much as three-fold in the last few years. This assures that a new 'floor' has been established for domestic production, ensuring that prices will never return to levels seen prior to 2004. It also means that a lot of new projects are being postponed because the potential returns do not match the cost and risk profile.

One final analogy to Melville's great expression of humanity is to be found within his character Ishmael, who could be described as a distillation of us all; diligently looking for a way out of his state of perpetual dissatisfaction. Clearly this describes our collective circumstance. While we strive for energy independence, there is no agreement on how to accomplish this formidable challenge and there are a number of difficult compromises that we need to expect:

(1) Expect more price volatility. Legislation proposed in the U.S. Congress, referred to as "NOPEC" would remove immunity for sovereign countries from

antitrust action. If something this radical succeeds, OPEC could be provoked into flexing its collective power and strangle the U.S. economy by curtailing exports to the U.S.

(2) Expect the rapid growth of carbon credits and organized markets in which to trade them. Despite political reluctance for the U.S. to sign-on to targets for reductions in effluents, the momentum for this idea is strong world-wide and domestic traders are likely to make markets that lead the way to wider adoption.

(3) Watch for the rapidly growing significance of Turkey in the energy sector. That nation's economy is growing solidly behind pro-market policies of the current government and the interjection of private investment. Turkey has become a major energy hub for natural gas flowing from some of the former Soviet nations to the rest of the world, and pipelines are now flowing millions of barrels of oil each day into Europe. All this could change rapidly depending upon the outcome of the July 22 elections. Turmoil within Turkey rising from those promoting radical Islamic policies could reverse these gains and add to the international chaos.

(4) Expect the development of non-conventional fuels such as bio-diesel, bio-propane, ethanol and other renewable

sources to continue to grow. All of these different fuels will be needed to contribute to achieving energy independence, but their acceptance and integration in our economy will be uneven over the next decade as we figure out how the necessary infrastructure investments are to be made.

(5) Finally, expect economic reality to force compromises between developers and environmentalists so as to allow for responsible access to new petroleum reserves. However adamant proponents are on either side of these issues, economic reality will eventually cause a compromise.

All this can be interpreted as providing strong support for investment in a wide array of domestic energy sources. West Virginia is rich in coal, oil and natural gas, and investments in these areas could serve to distinguish the State as an important contributor to our national security and economic vitality. Long-term investors in almost any form of domestic energy sources should be rewarded with outstanding economic returns over the next two decades. ▽

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Innovation in Producing Coalbed Methane Gas

Lynne M. Howard, Manager Intellectual Property
CDX Gas, LLC

Lynne Howard is the Manager of Intellectual Property for CDX Gas, LLC. Ms. Howard received her paralegal certificate from the University of Maryland University College, and has a background in legal studies. Ms. Howard has over 11 years' experience in the field of patent and trademark prosecution and management of general intellectual property matters.

Prior to her position with CDX Gas, she worked in the international section of a nationally recognized law firm, managing prosecution of international patent portfolios for clients in a variety of industries. Ms. Howard is currently focused on implementing programs to enhance CDX Gas' strong intellectual property position and supporting the company's technology licensing efforts.

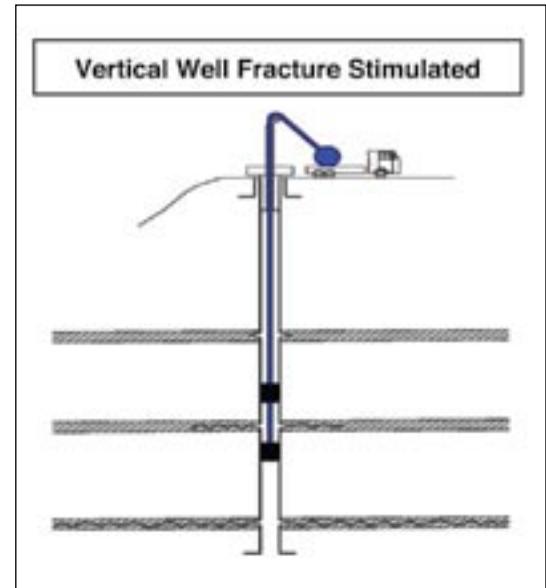
About CDX Gas

Formed in 1991, CDX Gas, LLC is a North American land-based natural gas exploration and production company headquartered in Dallas, Texas. CDX has patented the Z-Pinnate® Horizontal Drilling and Completion System to tap rich, low-permeability oil and gas reservoirs. CDX affiliated companies provide turnkey drilling services with coring rigs, a drilling rig fleet, directional tools and services, and full spectrum operating teams.

Methane gas found in coalbed reservoirs, commonly referred to as coalbed methane (CBM), is a natural gas that accounts for 7.5 percent of the natural gas consumed in the United States, according to the U.S. Geological Survey. Historically, CBM was viewed as a nuisance primarily because of the safety hazard it represents in coal mining operations. Due to technological advances over the past few decades, CBM is now recognized as a viable source of domestic energy in the United States. And with the heightened attention and favorable gas prices, an increasing number of players, large and small alike, continue to emerge into the market.

Oil and gas companies initially attempted to tackle the recovery of CBM utilizing conventional methods used to recover other natural gas resources – vertical drilling and fracturing techniques. It was soon discovered that these conventional methods did not find successful application in the majority of CBM reservoirs. Although CBM reservoirs extend in some cases to several thousand acres, coal seam thickness ranges from several inches to several feet. Thus, a single vertical well drilled from the surface into a coalbed has extremely limited exposure to the coal reservoir, and will only drain the methane within a relatively small radius around the vertical wellbore.

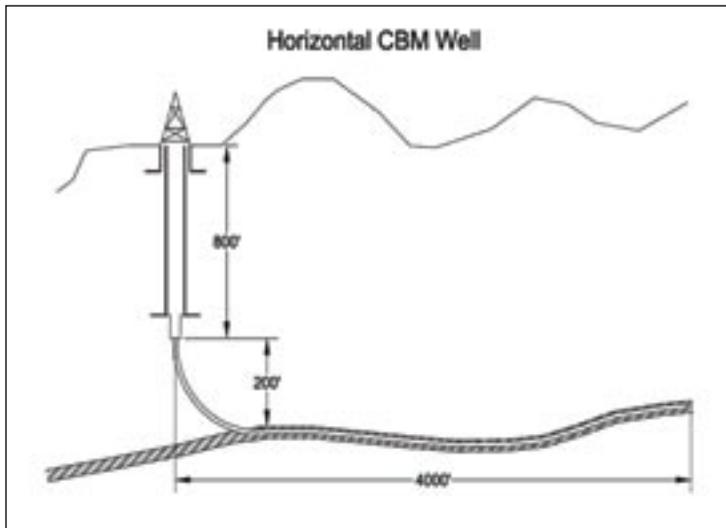
Even upon stimulating the coalbed through mechanical fracturing methods (“fracing”) in an attempt to cause a larger portion of the reservoir to be exposed to and in communication with the vertical wellbore, results show that production rates and ultimate volume of recovery in many instances still does not meet commercial production criteria. Even if extraction by vertical wells can be accomplished economically, vertical wells are usually spaced on 80 acre units, so hundreds of vertical wells are necessary to develop a large CBM reservoir.



For obvious reasons, vertical well development is environmentally undesirable, expensive and, depending on the terrain, simply may not be an option.

With the realization that conventional “drill and frac” methods could not efficiently or economically tap into the abundant CBM resource, the industry turned its focus to horizontal drilling. Although horizontal drilling increases exposure to the reservoir with fewer surface wells, a problem still exists. In all CBM wells, the methane remains trapped in the reservoir until the overall reservoir pressure has been reduced. Pressure reduction is accomplished by removal of water entrained in the formation. Unfortunately, the most optimal methods for dewatering do not work well in horizontal well bores or around the curved portion of a radius bore. Thus, the dewatering process is often inefficient in a horizontal well, thus hampering the recovery of CBM.

Because CBM reservoirs are inherently low pressure formations, further problems are confronted both in vertical and horizontal



Even with recent advancements improving vertical and horizontal drilling methodologies, the industry still experiences marginal or uneconomic results in more challenging CBM reservoirs, such as the Appalachian Basin. As a result of patented drilling

a positive environmental effect through minimal surface disturbance while still accelerating hydrocarbon recovery.

While each component of the system overcomes particular disadvantages of conventional methods, the system as a whole has produced extraordinary and repeatable successes. The combination of vertical and intersecting horizontal wellbores results in the ability to achieve underbalanced drilling conditions, which is critical in the development of CBM. The underbalanced drilling condition avoids formation damage caused by the drilling fluid and “cuttings” which otherwise negatively affect permeability.

The combination of vertical and horizontal wellbores enhances the dewatering process, as it provides for more efficient downhole water separation and enables the use of optimal dewatering methods.

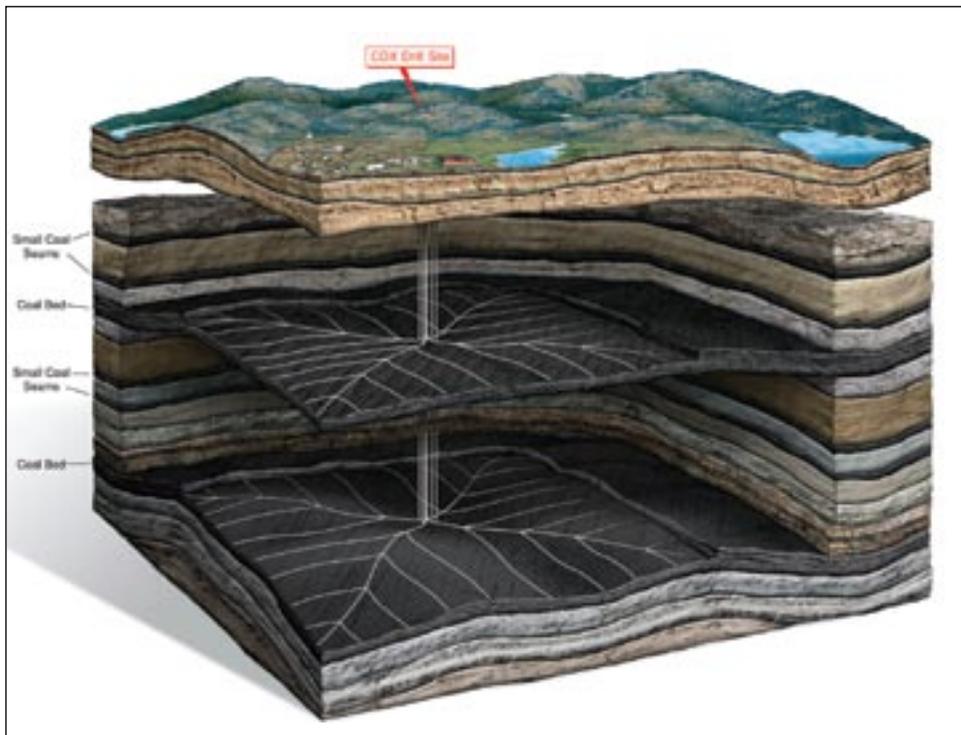
The multi-lateral drainage network increases exposure to the coalbed for more uniform drainage and greater initial production rates. In fact, CDX has experienced recoveries of up to 80 to 90 percent of the CBM in an eight- to nine-year period, with as much as 75 percent of the ultimate recovery occurring in less than five years.

This accelerated and increased ultimate hydrocarbon recovery represents significant economic benefits and economies of scale as evidenced by a decline curve comparison.

It is amazing to look back in history and track the path of innovation in the oil and gas industry. Absent innovation in the case of CBM, this abundant natural resource would still today simply be an obstacle to the recovery of coal. Instead, hardworking, talented individuals applied unconventional wisdom to develop new methods and techniques to access and capture CBM. Innovation allowed the transformation of this obstacle into a viable commodity and internationally recognized resource base. ▽

drilling operations. Particularly, the fluids used to operate the drill bit and transport cuttings to the surface exert a hydrostatic pressure on the reservoir. If this hydrostatic pressure exceeds the pressure in the gas formation, drilling fluids and cuttings can be pushed into the small cracks and natural fractures of the reservoir. These small cracks and fractures are pathways needed for the production of CBM. If the pathways are plugged by the drilling fluid and cuttings, the methane remains trapped in the coal, unable to migrate to the wellbore.

technologies introduced by CDX Gas, producing CBM is more efficient and effective, even in the most environmentally sensitive areas. This patented technology, known as the Z-Pinnate® Horizontal Drilling and Completion System, combines a vertical and intersecting horizontal wellbore system, underbalanced drilling techniques, a multi-lateral drainage network and other technologies that permit access of up to 1,800 acres of coalbed from a single well site. Utilizing substantially fewer surface penetrations, application of the technology results in



*Z-Pinnate® Horizontal Drilling and Completion System
Quad Dual-Well System with Pinnate Drainage Pattern/Dual Stream Completion*



Post-Mined Land Use: A Win-Win Opportunity

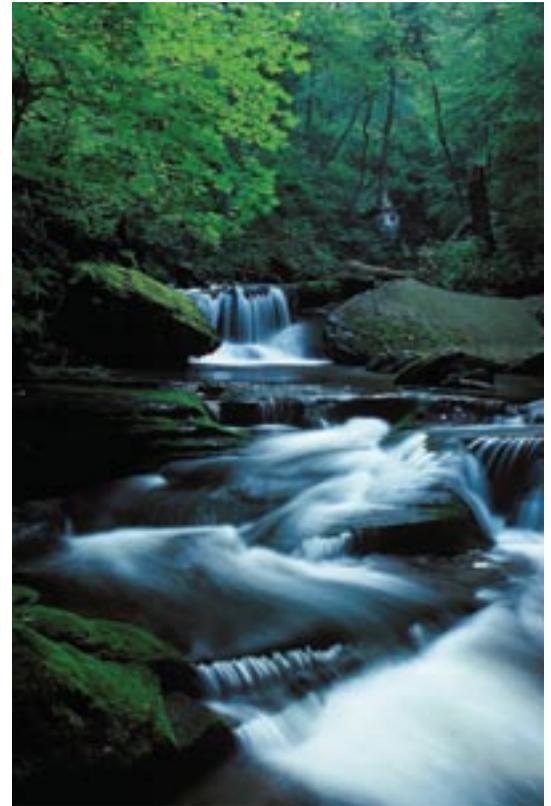
Kasey L. Russell, Executive Director
West Virginia Land and Mineral Owners Council

Kasey Russell is the founder of Russell Resource Solutions, a West Virginia-based company providing project management, lobbying and consulting on public policy issues, including mitigation, land use and natural resource extraction. These services are provided to a number of government, corporate and private clients, who have a significant stake hold interest within West Virginia.

She currently serves as Executive Director of the West Virginia Land and Mineral Owners Council, natural resource editor for WV Executive magazine and project manager for several land development projects. As an urban forester, she worked with the USDA Forest Service in Washington D.C. and West Virginia.

The use of lands after the extraction of coal is completed, or post-mined land use (PMLU), holds the potential of providing significant positive influence to the economy, environment and community of West Virginia. Over 1,000 surface mine sites, ranging in size from 20 to 5,000 acres, are currently in one of several phases of completion. These sites are located within 23 of the state's 55 counties – often in areas that have had difficulty sustaining and expanding local economies, lack affordable housing and/or have significant environmental and quality of life challenges.

Many significant opportunities to maximize post-mined lands have been lost in past years, but the causes of this loss can be addressed and a much more effective process to determine highest and best use of these lands can be initiated. The key to maximizing the benefits from PMLU does not rest only with the coal operator or landowner, but rather with a list of stakeholders that includes local, state and federal governments, watershed or other nonprofit groups, community leaders and the public. Not all sites are located in a market that justifies development of these properties for immediate economic benefit; however, all hold potential for benefit to the owner and community.



Natural resource extraction is historically contentious. Coal has dominated the state's economy, culture and political landscape for multiple generations. Our collective community has not often found the synergy that is possible between the coal industry, landowners, surrounding community, environmental groups and government to maximize the benefits associated with post-mined lands. This lack of a shared vision, which often is represented by a general lack of trust, is robbing our state of PML's ultimate potential.

Coal is clearly the most significant economic engine for the state of West Virginia. Coal provides over 60 percent of all business taxes within West Virginia. It is the source for 99 percent of all electrical power used in West Virginia. Coal extraction is a private enterprise.



It is capital intensive and requires a high level of expertise in a number of fields including geology, engineering, law, finance, marketing, transportation and management. The current work force is highly trained and in great demand.

The common goal of both the coal operator and the owner of the surface land is the extraction of coal. Defined by a contract that is negotiated at arm's length, this contractual relationship dictates the party or parties that will determine the post-mine land use. Though the process

is influenced by the regulatory agencies that issue the mining permits, it is the parties in that contract that have a dominate position in the determination of the end use of the subject property.

Since 1977, all surface mining operators have been required to return the mining site back to its original contours. Exceptions to this requirement are granted during the permitting process, as dictated by West Virginia

Department of Environmental Protection. Property that has been identified by the county in which the property is located for special consideration under an approved county Land Use Master Plan may be reclaimed for a future land use. Properties that do not have this favored status are required to have an eminent alternative land use, or the property must be restored to its original contours.

Post-mine land use presents an opportunity to bring everyone together

to create an end result that is beneficial to all stakeholders. With the exception of public services, impoundments of water, and fish and wildlife habitat, the end use for mined properties is market-driven. The opportunity for a sustainable land use requires the determination of the highest and best use for the property and must reflect an existing or foreseeable need in the market place. The ultimate decision on how the land will be used post-mining should remain that of the landowner and market. The most important collective action we as a community can take is to create incentives and solutions so that all stakeholders and contributors to the process can work together to make the effective use of PMLU a reality. ▽



History of Coal to Liquids and What's Holding It Back

Joseph A. Regnery, Director of Project Development
Rentech, Inc.

Joseph Regnery is Director of Project Development for Rentech, Inc., and is responsible for helping to advance the commercial deployment of Rentech's proprietary Fischer Tropsch technology through project specific development. His project responsibilities include site assessment and selection, government and regulatory relations, community relations, environmental permitting, marketing and sales, procurement and finance.

Mr. Regnery has over five years of project development, finance and structuring experience in the Independent Power Sector that translates well into the CTL/Polygeneration Industry. Mr. Regnery graduated from the University of Wisconsin in 1987 and from Case Western Reserve School of Law in 1990. He joined Rentech in 2005 after serving as the Southeast Regional Counsel for Calpine Corporation. He is a member of the Florida Bar Association.

Mr. Regnery credits his co-workers, John Marr and David Perkins, as co-authors of this article.

History of Coal to Liquids

The process to gasify coal, converting it into a synthesis gas made up mostly of hydrogen and carbon monoxide, has been around since the 1700s. Gasification of coal was used extensively during the late 1800s and early 1900s as the means by which major cities lit their streets and heated their buildings, commonly known as "town gas" or "blue gas." With the advent of the electric light bulb and cheap natural gas, town gas was pretty much discontinued by the mid-1900s for anything but industrial applications.

Utilization of gasified hydrocarbons as a feedstock for producing liquid products began in the chemistry labs of Germany about 100 years ago. Franz Haber, around 1905, first developed a technology that produced nitrogen from the air and then around 1909 demonstrated the production of synthetic ammonia using hydrogen and nitrogen. Around 1913, while working for BASF, Carl Bosch advanced the Haber technology for synthesizing ammonia to a commercial scale using a high temperature catalytic process; during this same time he developed his own technology for producing large volumes of hydrogen by passing water and a form of gasified coal called "water gas" over a catalyst.

Also in 1913, Friedrich Bergius developed a process to hydrogenate coal to produce gasoline. In 1923, building on the Bergius technology, Mathias Pier, a chemist also with BASF, advanced the process for gasoline production to a commercial scale while at the

same time developing a process to produce synthetic methanol from gasified coal. And in 1923, Franz Fischer and Hans Tropsch developed an indirect liquefaction process to catalytically convert hydrogen and carbon monoxide from gasified coal into diesel fuel and chemicals. These technologies have been further refined over the years by the world's major oil, chemical and fertilizer companies, as well as by companies like Rentech, increasing yields and expanding product applications.

Today, there are 117 gasification plants utilizing 385 gasifiers operating worldwide, converting solid hydrocarbons of all ranges (coal, lignite, petroleum coke, refinery pitch, biomass, etc.) into any number of industrial and commercial products (ammonia, methanol, hydrogen, solvents, waxes, lube oils, naphtha, diesel, jet fuel, etc.). With advancements in synthesis gas cleanup technology, these plants are now approaching regulated emissions profiles comparable to facilities that use crude oil or natural gas as feedstock, at significant reduction in variable costs, given the price differential between solid hydrocarbons, crude oil and natural gas.

By merging these industrial product applications with integrated gasification combined cycle power generation blocks, in configurations referred to as polygeneration, many of these plants produce multiple products while achieving fuel conversion efficiencies from a power perspective far beyond those achievable through traditional boiler technologies.

What's Holding Coal to Liquids Back?

Beyond the normal financing challenges that face all new industrial projects, such as the ever-rising cost of equipment, labor and materials; limited investment dollars; construction delays etc., coal-to-liquids (CTL) projects face three obstacles that continue to stifle the industry. Those obstacles are 1) uncertainty around product pricing; 2) technology uncertainty; and 3) regulatory uncertainty.

Product pricing uncertainty is attributable to the market risk associated with the commodity nature of the products. Fertilizers, chemicals and fuels are generally fungible products that can be produced by alternative means, primarily from oil and natural gas, and so the project returns must account for downturns in the worldwide commodity prices of crude oil and natural gas. To ease concerns of financiers looking to invest in multi-billion dollar gasification plants, the developer has to find a means to mitigate the risk or the project will stall. The two most often used means to address product pricing uncertainty are long term contracts with creditworthy entities and hedging.

Long term contracts pass the market risk on to the consumer and as such are difficult to come by, given the fungible nature of the products. Product differentiation and price differentiation can oftentimes overcome this hurdle. If you can present your products as an improvement over the general commodity based on quality, performance or environmental profile, and that improvement is valued by your customer, you have a chance for a long term contract. If you can price your product so as to reduce volatility or share the market risk, and that pricing improvement is valued by your customer, you have a chance at a long term contract. This is one area where government assistance could certainly help in fostering industrial and commercial applications of CTL. If the United States is truly serious about energy security and weaning itself off of foreign oil, then entering into long

term contracts for fertilizers, chemicals and fuels produced from gasified domestic hydrocarbons seems like a win-win proposition. Federal, state and local government agencies all could participate in this effort, and currently proposals are being advanced in the U.S. Congress.

Hedging passes the market risk on to an institution that is capable of absorbing it by pricing a paper position or having a physical position in the commodities or the commodities' primary cost drivers, mitigating price volatility. A trading institution that can purchase futures/options in crude oil and natural gas can offer such hedging arrangements as well as a company that has a long oil & gas position. Currently, the cost of such hedges are simply too expensive for CTL projects to absorb. This is another area where government support could be helpful, and a number of current proposals are being advanced in the US Congress that address hedging/price certainty. Assuming investor concerns regarding pricing uncertainty can be addressed through hedging or through long term contracts, the next major hurdle to overcome is technology uncertainty.

Technology uncertainty is attributable to efficacy risk associated with the gasification equipment, product application equipment and the integration of that equipment. Even though the base technologies have been around for a long time, the equipment is not off the shelf, especially when integrated in multiple application maximum efficiency configurations, so the project must account for potential performance concerns.

There are only a dozen or so commercial scale gasifier designs operating in the world today, and of those only a handful have performance, delivery and emissions guarantees associated with them. Each design has advantages and disadvantages given the different feedstock qualities and product applications. Coal quality can be a determining factor in whether or not

a particular design will work at a given project location, with high chlorine, high ash, high moisture, low Btu content oftentimes knocking out certain gasifier designs from consideration.

The chemical composition of the syngas produced from a particular gasifier design often renders the gasifier design uneconomic for a particular product application. This narrows the field of financeable gasifiers even further. In addition to the gasifier, the air separation units, syngas clean up systems, product application units and power blocks all carry with them their own efficacy risk.

Certain technologies tend to be considered more proven than others based on the number of pieces of equipment in operation. The net effect is limited equipment choice. With limited equipment choice, price goes up and meaningful warranties and guarantees go down. Exacerbating the problem is the fact that in order to constrain operating costs, these pieces of equipment have to be integrated so as to optimize production efficiency and to minimize parasitic demands. This necessitates unique, or at least what lender's engineers may consider as novel, configurations. Such configurations require Equipment Procurement and Construction (EPC) wraps to address integration performance risk. EPC contractors, backed with minimal risk being taken by the equipment suppliers, tend to offer less coverage in the way of integrated design wraps.

Given that the traditional method for addressing efficacy risk is limited (EPC wraps backed by equipment guarantees and liquidated damages) at this time, the CTL industry has looked for new and innovative ways to address technology uncertainty.

(continued on p. 53)



Energize West Virginia: Natural Gas Industry Looks to Inform, Educate

Kim Nuzum-Lawrence, Executive Director
Energize West Virginia

Kim Nuzum-Lawrence is the new Executive Director of Energize West Virginia, a non-profit alliance designed to gain statewide understanding of the natural gas industry.

Ms. Nuzum-Lawrence is also a partner in the Charleston-based political consulting and marketing firm, Rainmaker Media Group, where she serves as Vice President of Communications and Public Relations. The company won a coveted Pollie Award this year from the American Association of Political Consultants. Pollie Awards are given to the top political consulting firms in the nation and recognize achievement in political advertising and communication.

A native of Wheeling, Ms. Nuzum-Lawrence has been involved in the field of communications for more than 25 years. After serving as public information coordinator for Ohio County Schools, Ms. Nuzum-Lawrence moved to Charleston, where she served as Director of Communications and spokesperson for the West Virginia Department of Education from 1991-2002.

A graduate of West Liberty State College, she earned her master's degree from West Virginia University.

The first time I heard the term "roustabout" was in 1964, and it was the title of an entertaining movie musical starring Elvis Presley as a worker in a traveling carnival. I never imagined that, more than 40 years later, the terms "roustabout," "rig hand," and "roughneck" would become a regular part of my vernacular.



As the new Executive Director of Energize West Virginia, I have embarked on a steep learning curve about the natural gas industry in the Mountain State; a curve as precipitous and exhilarating as some of the roads I have traversed to drilling sites. I have discovered that these roustabouts, along with geologists, landmen, well tenders, fieldmen, pipeline engineers and many others display remarkable strength and ingenuity as they bring us this valuable resource.

Never before has there been a more exciting time to be associated with energy and the natural gas industry. Energy is one of the most critical and defining issues of this century; and West Virginia is poised to be a major source of energy for the entire country. All across West Virginia, people use natural gas to warm their homes, cook their meals and heat their water. More than 400,000 West Virginia homes, businesses and industries use natural gas. Natural gas is the cleanest-burning fossil fuel and it is abundant in the Appalachian Basin. That's why this new alliance,

Energize West Virginia, is so important to our future.

Energize West Virginia is a non-profit alliance established in 2006 to gain statewide understanding of the natural gas industry in West Virginia. It is a cooperative venture between two of West Virginia's leading

energy associations: WVONGA (West Virginia Oil and Natural Gas Association) and IOGA (Independent Oil and Gas Association of West Virginia). With generous financial commitments by member companies, Energize West Virginia

will work toward informing and educating citizens about the natural gas industry and the tremendous benefits of this energy source.

In addition to this community relations effort, Energize West Virginia has two key goals: student education and workforce development. Currently, more than 15,000 people are employed in the natural gas industry in West Virginia, and that number is expected to grow significantly over the next five years. With the anticipated retirement of the baby boomer generation, more than 3,000 additional workers will be needed in a variety of capacities. From well tenders to geologists to petroleum engineers, thousands of good-paying jobs will be available in the industry. In fact, Energize West Virginia recently launched its first flight of statewide billboards that underscore the burgeoning natural gas industry in the Mountain State. Two more series of billboards will be posted later this fall that illuminate the comfort, convenience and economic impact of this energy source.



Natural Gas

Fueling our future with
15,000 West Virginia jobs

energizewv.com | 



Another important component of this effort will be student education. Energize West Virginia is working toward building an energy education curriculum that will allow students at all grade levels to learn more about the importance and significance of natural gas. Energize West Virginia has partnered with experts in the private sector and public education to develop lesson plans for teachers that incorporate elements of the industry



in lessons offered in math, science, technology and other areas.

As the marketplace demand for natural gas continues to grow, so does our need for knowledge and information. Because it is the cleanest-burning fossil fuel and leaves the least obtrusive footprint after it is extracted, natural gas is redefining itself as the fuel of our future. Natural gas is fast-becoming the nation's preferred energy

source because its delivery is efficient and convenient and it introduces virtually no pollutants into the environment.

As I have continued to immerse myself in learning about the natural gas industry, I made another surprising discovery. Aside from NASA, the oil and natural gas industry uses more computer technology than any other industry in the United States! Because the industry has been so successful in harnessing the power of technology, the natural resource will continue to allow us to minimize our dependence on foreign oil while protecting and preserving our environment.

Coupled with drilling projects and building infrastructure, the oil and natural gas industry invests more than \$1 billion dollars per year into West Virginia's economy. This makes natural gas a vital part of West Virginia's economic and energy future. As fossil fuels continue to meet global energy demands, the Mountain State is poised to provide the demand for natural gas for generations to come.

For more information about Energize West Virginia and the natural gas industry, log on to www.energizewv.com. ▽



Health & Safety Challenges of the Mining Industry

Rebecca J. Oblak
Bowles Rice McDavid Graff & Love LLP

Rebecca J. Oblak is a partner in the Morgantown office of Bowles Rice and concentrates her practice with mine safety and health litigation within the Energy Group. Subsequent to receiving her bachelor of science (cum laude) and master's degrees from Ohio University and her doctor of jurisprudence degree from the Capital University Law School in Ohio, she moved to West Virginia and entered private practice in Morgantown, West Virginia.

Ms. Oblak has represented mine operators, independent contractors and quarry operators in the areas of federal (Mine Safety & Health Administration under the 1977 Mine/2006 MINER Acts) and state violations involving safety and health issues, 110(c) special investigations, 105(c) discrimination cases, MSHA safety conferences and fatalities within West Virginia, Ohio, Virginia, Maryland, Pennsylvania and Colorado. She also conducts health and safety training seminars for mine management personnel and independent contractors as they relate to the federal and state mining laws and regulations.

Ms. Oblak is admitted to practice in West Virginia, Pennsylvania, the District of Columbia and the United States Supreme Court and the U.S. District Courts for the Southern and Northern Districts of West Virginia. She is a member of the American Bar Association, WV State Bar, WV Bar Association, Monongalia County Bar Association, Pennsylvania Bar Association and the District of Columbia Bar Association. She is a member of the WV Coal Association, National Mining Association, Holmes Safety Association, Kentucky Coal Association and the Energy and Mineral Law Foundation.



The tragic events of 2006 in the mining industry in West Virginia, Kentucky and most recently this year in Utah have once again brought a national spotlight to the mining industry, with intense scrutiny of the federal and state mine safety and health regulations.

In West Virginia, the end of 2005 saw an industry being praised as having just recorded its safest calendar year in mining. Those tributes ended abruptly on January 2, 2006 with the news of the Sago Mine tragedy. Shortly thereafter, on January 19, the Aracoma Mine tragedy occurred, followed by the Darby Mine tragedy in Kentucky on May 22, 2006. According to the United States Department of Labor, Mine Safety and Health Administration's Assistant Secretary, "...2006 was the worst year for coal mine fatalities in over a decade."

In 2006, the overall safety performance of the mining industry was questioned and the mining achievements, such as new technologies in the extraction of coal in combination with the most skilled, trained and experienced workforce responsible for such achievements, were disregarded. Compared to other industrial categories in 2006, coal mining ranked low in fatal occupational injuries; the most prevalent fatal occupational injuries according to the Bureau of Labor Statistics in 2006 were as follows: Construction (1226); Transportation/Warehousing (832); Agriculture/Forestry/Fishing (646); Manufacturing (447); Retail Trade (351); Financial Activities (122); Mining (except oil and gas, 67); Air Transportation (51); Coal (47); and, Hospitals (20). However, it is the consensus among all involved in the mining industry that even one mining fatality is too many.



On June 15, 2006, Congress enacted into law the Mine Improvement and New Emergency Response (MINER) Act of 2006, with the prospect to ensure that every miner returns home safely each and every day from his/her employment in the mining industry. Many states have followed the federal government's lead, establishing similar industry requirements, striving to acquire and deploy the most advanced technologies that will protect the underground miners. Prior to the accomplishment, by the mining industry and MSHA, of full implementation of the MINER Act of 2006, further federal legislation has been introduced to amend the aggressive MINER Act of 2006 with The Supplemental Mine Improvement and New Emergency Response Act [S-MINER] of 2007 and The Miner Health Enhancement Act of 2007.

Our present clients and friends who are mine safety and health professionals in this industry face huge future challenges, very diverse and much different from

when our federal and state mine safety and health regulations were initially enacted. Awareness of, and training in, the myriad of federal and state mine safety and health issues facing the industry today are critically important. The Bowles Rice legal team that specializes in this area, known as "Mine Safety and Health Lawyers," strongly encourages and recommends that mine operators and independent contractors take a proactive approach to health and safety issues by providing management personnel and front line supervisors with training seminars regarding the Federal Mine Safety and Health Act of 1977, the MINER Act of 2006 and the latest regulations and standards.

Coal mining is the most abundant fossil fuel produced in the United States. The United States Department of Energy has established that coal is one of the true measures of the energy strength of this country with one quarter of the world's coal reserves found

in the United States. Coal is known as the workhorse of the nation's electric power industry, supplying more than half the electricity consumed by Americans, so coal mining is here to stay. Today's challenge for the mining industry is to establish why mining accidents are happening and work toward the prevention of even one fatality, with the implementation of the health and safety regulations. ▽



Coal Sequestration and Property Rights: Many Questions Need Answers

Kimberly S. Croyle
Bowles Rice McDavid Graff & Love LLP

Kimberly Croyle is a partner in the Morgantown office of Bowles Rice and a member of the Energy Practice Group. She provides guidance and counsel in the areas of mineral energy production, including property acquisition, litigation matters involving real estate, curative action, title examination and other issues generated by the mining industry.

She is active in the areas of land use and development, representing developers in commercial and residential development projects, including business formation, project planning, zoning, permitting and state and federal compliance.

Ms. Croyle's practice also includes commercial real estate work, property acquisition and permitting and title searches. She has been appointed by the Monongalia County Commission to serve on the Monongalia County Board of Zoning Appeals.

Ms. Croyle currently chairs the firm's Total Quality Management Committee and is a member of the firm's Executive Committee. She is licensed in West Virginia, the United States District Courts for both the Northern and Southern Districts of West Virginia, and the United States Court of Appeals for the Fourth Circuit.

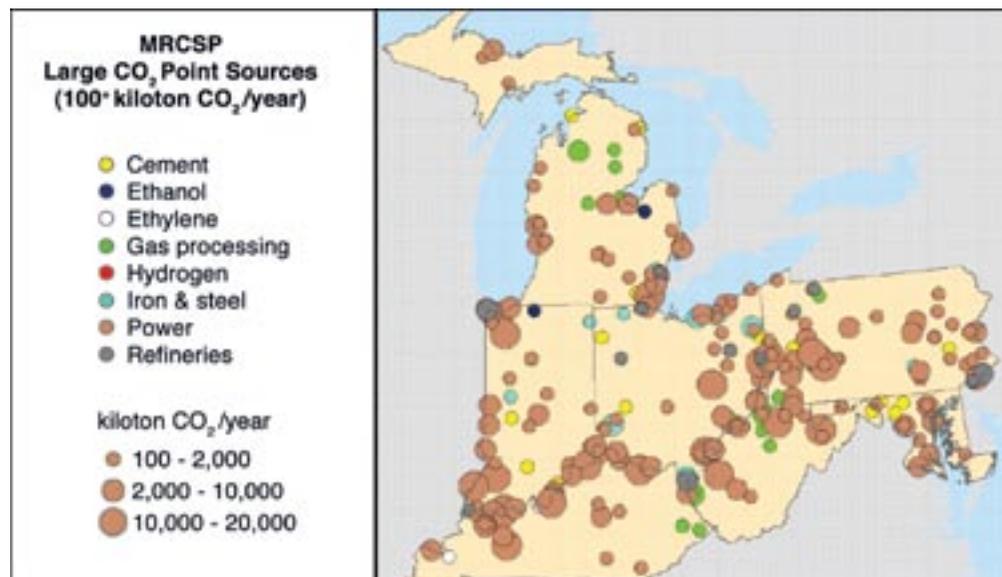
One cannot pick up a newspaper or turn on the television without being bombarded about the role that greenhouse gas emissions play in contributing to global warming. Whether you have downsized your SUV or not, the simple fact is that many states and the federal government have or are in the process of enacting legislation targeted to reduce emissions generated largely from coal-fired power plants and petroleum-based energy use. And more legislation is looming on the horizon. In response, initiatives have sprung up across the nation to assess the viability of capturing carbon based emissions and injecting those captured emissions into geological formations underground (carbon sequestration). In fact, the United States Department of Energy, through the DOE's National Energy Technology Laboratory (NETL) has engaged in seven partnerships throughout the nation to study the viability, potential and acceptability of carbon sequestration.

One such partnership is the Midwest Regional Carbon Sequestration Partnership (MRCSP).

The MRCSP, which consists of seven states – Indiana, Kentucky, Maryland, Michigan, Ohio, Pennsylvania, and West Virginia - is a “public/private consortium that is assessing the technical potential, economic viability, and public acceptability of carbon sequestration within its Region.” For these traditionally “Rust Belt” states, the work of MRCSP and its industry and research partners offers hope for a cleaner and greener future. In states like West Virginia, where 98 percent of its electricity is produced from coal, and Kentucky, where coal accounts for 91 percent of its electricity production, the opportunity to maintain a reliable and low cost power source and protect the environment while doing it presents a challenge worth exploring.

Because of the vast fossil fuel resources and the large sources of carbon dioxide that result of their production, the Region is a prime location for the development of carbon sequestration technology and usage. As the MRCSP explains:

[t]he MRCSP region is home to many large sources of CO₂ that are potential



candidates for employing Carbon Capture and Storage (CCS) technologies in the future. Of the 274 large (i.e., more than 100kt CO₂/year) CO₂ point source locations within the Region, 80 percent of the CO₂ emissions come from only 31% (or 85) of the facilities. Of these 85 sources, all but 7 are in close proximity to at least one candidate CO₂ storage reservoir, and all but one are within 50 miles of one or more potential storage options. Clearly, CCS technologies offer the prospect of providing tremendous leverage for the region's economy if deep reductions in greenhouse gases are needed [as shown below in MRCSP's Location of Large Anthropogenic Sources of CO₂ in the MRCSP Region].

Moreover, given the geological storage potential in the region, it stands to greatly benefit from clean technology by being able to capture and store the emissions it produces. These potential storage options include "oil and gas reservoirs, gas storage fields, unmineable coal seams, and deep saline reservoirs," all of which are readily available in the seven state region. The storage capacity available through these options for the MRCSP region alone is estimated at an average of more than 200 years, as shown on the MRCSP's Table (see below).

What are we waiting for? Well, we just wouldn't be lawyers if we didn't throw some law into the mix. Property rights and interests are as old as the country itself and the laws governing those rights are largely a product of State law. Because property laws differ from state to state, particularly where mineral interests are concerned, it is difficult to predict a uniform treatment for carbon storage. This is complicated even more depending upon the geological reservoir wherein the carbon dioxide is stored, as laws governing mineral interests, which would likely apply to carbon storage in reservoirs that have or have once contained coal, oil and gas, will differ from laws governing carbon storage in saline reservoirs.

Moreover, if the ownership interests are resolved, questions arise as to the ownership of, and the liability for, the carbon dioxide once it is injected into the ground. While most all states now recognize that title to oil or gas is not lost when the owner injects it into the ground, and presumably the same would hold true for carbon dioxide, what happens to that ownership if carbon dioxide is injected into a gas reservoir that still contains natural gas? What if the injected carbon dioxide migrates into land that has not been acquired for storage purposes?

Regulatory and tax issues must also be taken into consideration. If state and or federal legislation allows for "off-sets" or

credits for carbon sequestration, will those same legislatures dictate property rights? Will they attempt to tax the ownership of the carbon dioxide once it is in the ground? What about eminent domain? Will legislation be expanded to allow utility companies to acquire storage reservoirs by eminent domain through a certificate of public convenience or necessity?

These are but a few of the questions that need to be answered, through legislation and eventually through the Courts, in order to pave the way for a greener and cleaner tomorrow. ▽

References:

The Midwest Regional Carbon Sequestration Partnership (MRCSP), Phase I Stand Alone Executive Summary, December 2005, DOE Cooperative Agreement No. DE-FC26-03NT41981.

Energy Information Administration, March 2006.

The Midwest Regional Carbon Sequestration Partnership (MRCSP), Third Semi-Annual Progress Report, April 29, 2005, DOE Cooperative Agreement No. DE-FC26-03NT41981

State	Estimated Geologic Storage Capacity, Millions of tonnes CO ₂					Number of Large CO ₂ Sources	Annual CO ₂ Emissions from Large Point Sources (ktCO ₂)	Years of Storage Capacity
	Deep Saline Formations	Coal Basins	Depleted Gas Basins	Depleted Oil Plays	Total			
IN	30,640	200	50	30	30,920	46	162,208	191
KY	17,340	142	110	30	17,622	30	101,711	173
MD	4,920	40	10	20	4,990	17	37,637	133
MI	45,890	20	290	100	46,300	44	93,542	495
OH	34,810	437	260	150	35,657	44	148,405	240
PA	14,420	922	380	80	15,802	66	126,779	125
WV	13,580	1,246	220	60	15,106	27	96,340	157
MRCSP Total	~162,000	~3,000	~1,300	~470	~167,000	~274	~766,000	>200

Table 1. Preliminary Estimates of Geological Storage Capacity for the Region.



Expansion of Energy Exports Hindered by State's Tax Structure

Michael E. Caryl

Bowles Rice McDavid Graff & Love LLP

Michael E. Caryl is a partner based in the Martinsburg office of Bowles Rice. His primary area of practice is tax planning and tax litigation at all levels — federal, state and local. Mike served as West Virginia State Tax Commissioner from 1985 to 1988. During that same time, he was President of the 12-state Southeastern Association of Tax Administrators for 1987-1988.

Mike served as chairman of the State Bar Committee on State and Federal Taxation, president of the West Virginia Tax Institute, Inc., chairman of the Taxation of Business Committee of the West Virginia Chamber of Commerce, and Official Reporter for the West Virginia Law Institute's 1992 Property Tax Appeals Reform Project. In 1995, he was elected a Fellow of the American College of Tax Counsel. He served as vice-chair of the Governor's Commission on Fair Taxation (1997-1999).

Mike is a frequent speaker and writer about various taxation topics, and has served on the faculty of the Institute for International Training, Trade and Development, Inc. at Shepherd College in connection with its Russian Tax Officials Training Program.

A 1968 graduate of West Virginia University, Mike earned a bachelor of science degree in business administration, with high honors. He is a 1974 graduate of the Yale Law School. He is admitted to practice before the courts of West Virginia, the District of Columbia, the United States Tax Court, the United States Court of Appeals for the Fourth Circuit and the United States Supreme Court.

For decades, West Virginia's state and local tax structure has successfully exploited the combination of (1) the State's natural advantages in the generation of cheap electric power and (2) the rate-regulated nature of the markets in which that power was sold. As a result, a significant share of the burden of our state and local government spending has been shifted to the residents of other states.

This superficially favorable outcome was achieved by West Virginia's imposition of heavy gross receipts and property taxes on public utility electric power generation facilities — knowing that much of that power would be sold outside of the state. Since the public utility regulators, in those market jurisdictions, allowed the pass-through of that heavy tax burden as part of the costs the utilities recovered through their rates, their out-of-state consumers effectively contributed significant revenue to West Virginia's budget. Thus, the irony of turning the tables on the "outsiders" who have been (according to some "progressive" commentators) exploiting West Virginia's resources and people for more than a century, cannot be avoided.

Alas, with the deregulation of many of those out-of-state markets for electricity, this twentieth century version of the taxation-without-representation model has now become a noose, restricting West Virginia's potential as a national energy engine in the twenty-first century. That is because, in those deregulated markets, electric power monopolies have been eliminated in favor of free-market pricing of electricity as a commodity. Regrettably, West Virginia-generated power, still burdened with heavy taxes, is put at a disadvantage when it now has to compete with power generated in other, lower tax environments.

As a result of such circumstances, there has been little additional capacity added to the capital-

intensive West Virginia electric power generation industry in many years. Indeed, the little additional electric power generation capacity that has been developed in West Virginia in the last decade has only been as a result of the project developers' varied and complex arrangements to mitigate the impact of the current tax system.

Those arrangements have typically involved the use of either special statutory tax relief for pollution control equipment (including wind-powered turbines) or of sale and leaseback transactions with local government units based on negotiated payment-in-lieu-of-tax agreements. Without going into the details of such arrangements, the simple fact that these exceptions to our general tax structure are necessary to attract substantial investment in energy generation projects demonstrates how that structure effectively discourages such investment.

In a sense, this circumstance can be seen as simply a state and local level validation of the cynical adage that "capitalism breathes through the loopholes in our federal income tax structure." More fundamentally, it shows how West Virginia's capital-punishing state and local tax structure continues to restrain the progress that our state's abundant natural resources, proximity to the nation's markets and the magic of capitalism would otherwise bring.

As if there were not enough compelling reasons for fundamental restructuring of West Virginia's tax system, this is another. Moreover, the limitations and adverse consequences inherent in our current approach to taxation of electric power generation further expose the folly of our traditional "them against us" view of the national and world economies. Conversely, acting to overcome such deficiencies would be a good first step toward our broader participation in the prosperity that those economies offer. ▽



National Research Center for Coal and Energy at WVU: Where Energy Solutions Start

(continued from p. 9)

He and research leaders at the Universities of Kentucky, Utah, Pittsburgh and Auburn have worked with Congressional leaders such as Senator Robert C. Byrd to ensure funding for coal-to-liquids research programs, such as the Consortium for Fossil Fuel Science (CFFS). CFFS is the only national, university-based program researching the conversion of coal, plastics, biomass and other carbon-based materials into diesel fuels and hydrogen for the transportation sector.

Bajura also has been instrumental in developing a new U.S.-China Energy Center, with faculty in WVU's Davis College. The center is not only studying coal-to-liquids programs in China, but also is opening doors for West Virginia energy and business leaders to the vast Chinese market.

Partners in Carbon Sequestration Research

NRCCE currently is developing a project with Consol Energy to study injection of carbon dioxide in the Upper Freeport coal seam of West Virginia, Pennsylvania and Maryland. Consol has applied for a first-of-its-kind permit from the WV DEP for the injection. WVU will be providing geology, geophysical, geomechanical and reservoir modeling expertise, and will develop various techniques to detect leakage, if any, of carbon dioxide. NRCCE's Doug Patchen, who also works for the West Virginia Geologic and Economic Survey, notes

that if successful, the project could be excellent for WVU, for Consol, and for West Virginia. ▽



What Does Clean Coal Technology Mean to West Virginia?

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Lastly, Cumulative Hydrologic Impact Assessments (CHIAs), which are used to consider the cumulative impacts of multiple mining operations on an area's hydrology, have evolved and are now much more precise tools that regulators can use to determine whether a permit should be issued or denied.

The CHIA evaluates possible effects of acid mine drainage, new water quality standards, and an operation's potential impact on groundwater. The accuracy of CHIA predictions has improved greatly over time due to improved data, improved modeling and the development of preventive technology. Further, as health studies and additional sampling events are completed, West Virginia has proposed new water quality standards to more effectively protect our streams. While these efforts to better minimize and mitigate mining's effects on our environment are not as high profile and subsidized as clean coal technology research, they are occurring nonetheless. In fact, the West Virginia Department of Environmental Protection used federal funding from the Office of Surface Mining to fund 10 stream-gauging stations, create more than 200 trend monitoring stations for water quality and invest in a database to manage the data. These efforts will lead to more informed decision-making.

Recently, a study by The National Academies recognized that in addition to

funding clean coal technologies, efforts to improve environmental protection during the extraction of coal should be funded as well. The study cites several areas worthy of further research, including modeling the hydrological impacts of mining, improving mine mapping, and improving the construction and monitoring of coal waste (slurry) impoundments. Currently, the available methods for handling slurry are very limited with the use of impoundments being the most cost-effective method. Slurry cells and underground injection are two other methods. All have the potential to adversely affect the environment, posing threats to both surface water and groundwater resources. Funding for the development of new technologies to manage slurry would also greatly advance environmental protection efforts with regard to coal extraction. Because coal is so vital both to West Virginia's economy and to the nation's energy security, efforts to improve how we extract the resource both from an efficiency and environmental protection standpoint will be worthwhile.

West Virginia is poised to take advantage of both clean coal technology advancements and developments to improve environmental protection. A major utility is in the process of applying for permits for a new IGCC plant in West Virginia. This state-of-the-art plant has the potential to boost the state's economy, help ensure the nation's energy independence, and improve air quality as other older plants are eventually retired. In addition, West Virginia is on the leading edge of coal sequestration efforts as research continues within the state on injecting carbon dioxide into underground voids. Advancement of environmental protection efforts will continue regardless of any boost in federal funding for research and development. The state will move forward in incremental steps and allow technology to evolve in tandem with regulation. As more precise modeling techniques and more exact sampling technologies are developed, the state will adopt those methods and modify its regulations accordingly.

The nation should invest in improved mining processes, while at the same time investing in clean coal and alternative energy technologies. This will help sustain the economy in states like West Virginia, while finding new innovations and investments for supplying our energy needs. We have to be open to harnessing the power of everything from developing clean coal technologies to using reclaimed mine lands to develop new methods of creating energy – a clean coal “technology” opportunity in its own right. Development of these technologies has the potential to result in unexpected benefits in other industry sectors as well. These efforts will result in a vibrant economy, a healthy environment and energy security for both West Virginia and the nation. ♡

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Generating Electricity in a Carbon-Constrained World

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Combined cycle power generation employs one or more gas turbines, a heat recovery steam generator (HRSG) and a steam turbine. The syngas is fired in a gas turbine. The hot exhaust from the gas turbine passes to the HRSG, which produces steam that drives a steam turbine. Power is produced from both the gas and steam turbines.

An IGCC power plant resembles a chemical plant more than a traditional pulverized coal power plant. As such, it is easier to manipulate the composition of process streams, and thus is a more robust technology in light of the potential for the addition of future regulations requiring further reductions in pollutant emissions, including CO₂. Today, IGCC technology is the only power generation technology with a proven capability to capture CO₂.

In addition to developing new, lower-emissions generating technology, AEP plans to install carbon capture technology on two existing coal-fired plants, the

first commercial use of pre- and post-combustion technologies to significantly reduce CO₂.

AEP has signed a memorandum of understanding with Alstom, a worldwide leader in equipment and services for power generation and clean coal, for post-combustion carbon capture technology using Alstom’s Chilled Ammonia Process.

This technology will first be installed in mid-2008 on the Mountaineer Plant, where up to 100,000 metric tons of CO₂ will be captured per year. The captured CO₂ will be designated for geological storage in deep saline aquifers at the site.

AEP will subsequently install Alstom’s system on one of the 450MW coal-fired units at its Northeastern Station in Oologah, Oklahoma. It is expected to capture about 1.5 million metric tons of CO₂ a year, and will be used for enhanced oil recovery.

Alstom’s system captures CO₂ by isolating the gas from the power plant’s other flue gases, and can significantly increase the efficiency of the CO₂ capture process. The system chills the flue gas; recovering large quantities of water for recycle, and then utilizes a CO₂ absorber in a similar way to absorbers used in systems that reduce sulfur dioxide emissions. The remaining low concentration of ammonia in the clean flue gas is captured by cold-water wash and returned to the absorber. The CO₂ is compressed for enhanced oil recovery or storage. In laboratory testing sponsored by Alstom and others, the process has demonstrated the potential to capture more than 90 percent of CO₂ at a cost that is far less expensive than other carbon capture technologies. It is applicable for use on new power plants, as well as for the retrofit of existing coal-fired power plants.

Oxy-Coal Combustion Technology

AEP also has signed a memorandum of understanding with The Babcock &

Wilcox Company (B&W) for a feasibility study of oxy-coal combustion technology. B&W will complete a pilot demonstration of the technology this summer at its 30MW Clean Environment Development Facility in Alliance, Ohio. Following this demonstration, AEP and B&W will conduct a retrofit feasibility study that will include selection of an existing AEP plant site for commercial-scale installation of the technology and cost estimates to complete that work. Once the retrofit feasibility study is completed, detailed design engineering and construction estimates to retrofit an existing AEP plant for commercial-scale CO₂ capture will begin. At the commercial scale, the captured CO₂ will likely be stored in deep geologic formations. The oxy-coal combustion technology is expected to be in service on an AEP plant in the 2012-2015 time frame.

B&W, in collaboration with American Air Liquide Inc., has been developing oxy-coal combustion, a technology that utilizes pure oxygen for the combustion of coal. Current generation technologies use air, which contains nitrogen that is not utilized in the combustion process and is emitted with the flue gas. By using pure oxygen, oxy-coal combustion excludes nitrogen and leaves a flue gas that is a relatively pure stream of CO₂, ready for capture and storage. This collaborative work on oxy-coal combustion began in the late 1990s and included pilot-scale development at B&W’s facilities with encouraging results, burning both bituminous and sub-bituminous coals.

The oxy-coal combustion process will use a standard, cryogenic air separation unit to provide relatively pure oxygen to the combustion process. This oxygen is mixed with recycled flue gas in a proprietary mixing device to replicate air, which may then be used to operate a boiler designed for regular air firing. The exhaust gas, consisting primarily of CO₂, is first cleaned of traditional pollutants, then compressed and purified before storage.

Appalachian and AEP take their public utility responsibilities seriously. We know

that our product is a fundamental necessity of life and a key driver of economic growth and prosperity. Our customers expect us to be in a position to meet their increased power demands in a reliable and reasonably priced manner.

We also deeply understand our concurrent responsibilities to comply with the environmental laws of the United States and the states in which we operate.

Our commitment to fulfill these responsibilities has led the senior management of both Appalachian and AEP to proactively address the challenges of a carbon-constrained world. ▽

History of Coal to Liquids and What's Holding It Back

(continued from p. 43)

Some projects have sought efficacy insurance, others, through corporate structuring, have sought to isolate their unconventional technology risk, but the most often means of addressing technology uncertainty continues to be the infusion of additional project sponsor equity.

This is another area where government backing would be tremendously helpful. Loan guarantees, like those delineated in the 2005 Energy Policy Act, either self paid (like an insurance program) or government funded, would certainly ease investor concerns over equipment performance filling the gap until such time when there are enough projects operational that they become reference plants able to be wrapped and guaranteed by EPC contractors and equipment suppliers. Assuming investor concerns regarding technology uncertainty can be addressed through conventional means, such as wraps and guarantees or through unconventional means such as efficacy insurance, corporate structuring, equity infusion and loan guarantees, the last major hurdle to be overcome is regulatory uncertainty.

Regulatory uncertainty is attributable to environmental permitting risk associated with new legislative mandates on air emissions, in particular, green house gas emissions. CTL projects, with respect to regulated emissions, are generally permissible in attainment areas as their regulated emissions profiles are comparable to those of other industrial projects. Uncertainty arises with regard to unregulated GHG emissions. Significant political and social debate about the CO₂ issue is currently taking place in the US, and there are many questions yet to be answered before a project sponsor, investor or lender can be comfortable in terms of future political, legal and technical solutions / requirements related to carbon constraints such as a carbon tax or carbon sequestration requirements, and the associated economic impacts at the project level.

Scientists working under the U.S. Department of Energy's Regional Carbon Sequestration Partnership Program have formed seven regional public – private partnerships to study ways to significantly reduce anthropogenic emissions of green house gases. Carbon Capture and Sequestration (CCS) is a potential way to accomplish this goal by capturing CO₂ at a source before it can be emitted to the atmosphere, and directly storing it in deep underground reservoirs and sinks represented by geologic formations and traps, deep, unmineable coal seams and deep saline aquifers.

At present, the only commercially feasible direct CO₂ sequestration opportunities in the United States are related to tertiary oil recovery operations using enhanced oil recovery (EOR) techniques, where CO₂ is injected subsurface into an oil field's producing horizon(s) to increase the recovery of oil from such field. As a result, CTL projects will have limited siting options in the near term, as such projects will need to be located in areas that provide EOR opportunities. This represents a real opportunity, especially in the West and Southeast where there are a number of oil fields capable of utilizing EOR technology.

Interestingly, a common link between the oil industry and the coal industry was identified in a study by Advanced Resources International. In the context of CTL/FT Fuel production, that found that when utilizing the CO₂ produced in the CTL process for EOR purposes, each barrel of CTL / FT Fuels produced resulted in two additional barrels of EOR-related crude oil production. ARI estimated that the United States could produce approximately 4 million incremental barrels of oil per day (47 billion incremental barrels of oil over a 30-year period) utilizing CO₂ captured and sequestered in the coal gasification and F-T fuel production processes.

The domestic CTL industry can take on an important “pathfinders” role in the ongoing scientific effort related to CO₂ capture and storage that goes beyond EOR by providing the impetus to move the entire CCS effort out of the lab and into real time CCS demonstration projects by providing a large scale source of CO₂ to allow the scientists to design, implement and subsequently study and verify actual large scale CO₂ sequestration operations at several locations throughout the United States. This would accelerate the learning process and ultimately lead to other well established CCS technologies, while at the same time accelerating the promulgation of heretofore undeveloped laws and regulations governing such activities, such as liability, ownership of the pore space in which the CO₂ would be stored, and other legal considerations. This course of action would also lead to a much better understanding of the economics related to CCS and ultimately help drive down the costs associated with carbon capture and storage.

An additional solution beyond sequestration to effectively offset a CTL project's carbon footprint in the future may be the co-gasification of bio-mass with coal. This technology is in its infancy and will mature over time as the coal gasification technology and commercial facilities become operational and the blending of fuels is tested and proven. This

opportunity will be a future transition to more of a “Green Fuel” concept that the federal and state governments can encourage with grants, cost sharing of the co-feeding components and working with the then commercial facilities to encourage the use of bio-mass as the technology is better understood and developed for gasification. Assuming investor concerns regarding regulatory uncertainty can be addressed through carbon capture sequestration or through some other means like biomass co-feed, the last major hurdle can be overcome.

The reality today is that product pricing, technology and regulatory uncertainties are having a stifling effect on the commercialization of CTL technology. Fortunately, from a micro-economic project perspective, the strategies for overcoming these obstacles are working here in the United States in circumstances involving the production of contracted products using commercial technologies and configurations, at sites where economic CO₂ solutions exist and, from a macro-economic industry perspective, these obstacles exist to a lesser degree overseas. Perhaps by advancing the technology here, in a limited context and abroad in a macro context, CTL will become a commercially viable solution to meeting the world’s needs for fertilizer, chemicals and fuels. ▽

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