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Dimmer Outlook For Energy Sector

Environmental regulations and new energy sources add up to higher costs and prices for Kentucky's producers and consumers

By Gary Wollenhaupt

Bad news continues to batter Kentucky on the energy front, with falling coal and natural gas production exacerbated by new strict environmental regulations. However, the state's research investments could help the state maintain its role as a top national energy leader.

Rapid growth in natural gas production nationally, in conjunction with a raft of new U.S. Environmental Protection Agency rules governing power plant emissions, has led to a steep fall-off in coal use for energy generation. In March, coal had only a 34 percent share of national electricity generation, the lowest ever reported, according to the National Energy Information Administration.

Only natural-gas power plants can meet the EPA's new emission regulations. Coal plants will require extensive and expensive modifications.

The impact in disproportionately coal-burning Kentucky, where cheap power long has been an economic linchpin, could be dark and empty facilities in the future rather than today's energy-intensive operations that employ several tens of thousands of state residents.

Kentucky's coal production peaked in 1990 at 173.3 million tons and 20 years later in 2010 stood at around 105 million tons, which represents about 10 percent of national production. The state's share of U.S. coal production peaked 15 years before 1990, however, as massive mining operations on large deposits in places such as Wyoming commenced.

What is little changed is that about 90 percent of Kentucky's electricity comes from coal-fired plants. That's about two and a half times the national coal feedstock mix, which is declining. Power plants in Florida and Georgia, two of the largest out-of-state destinations for Kentucky coal, are switching over to lower-priced natural gas.

Utilities are forecast to burn 796 million tons of coal this year, a 14 percent decline from last year and the fewest tons since 1992, according to Energy Department data.

The commonwealth has shared in the boom in natural gas drilling activity the past decade. But some of the large natural gas producers are leaving Kentucky's Devonian Shale play to drill in the more productive Marcellus Shale formations that stretch from western New York through Ohio, Pennsylvania and West Virginia.

Perhaps the most crucial energy-sector development is that the price of natural gas has fallen by half nationwide since 2008 due to the major increase in domestic supply. The gas production bubble resulted after drillers learned to use hydraulic-fracturing – known as "fracking" – in geologic structures whose hydrocarbon bounty previously could not be tapped profitably.

"It's been a dramatic change," said John Davies, deputy commissioner for the Kentucky Department for Energy Development and Independence. "If you had predicted today's prices a year ago, you would not have been taken seriously."

The price fell below \$2 per thousand cubic feet in the spring and by late June was around \$2.70 per thousand cubic feet. In 2008, however, it had been above \$8.

Still abundant but no longer cheapest



The E.W. Brown Generating Station on Herrington Lake in Mercer County has three coal units totaling 700 megawatts, supplemented by six natural gas/fuel oil turbine units that can generate 768 megawatts.

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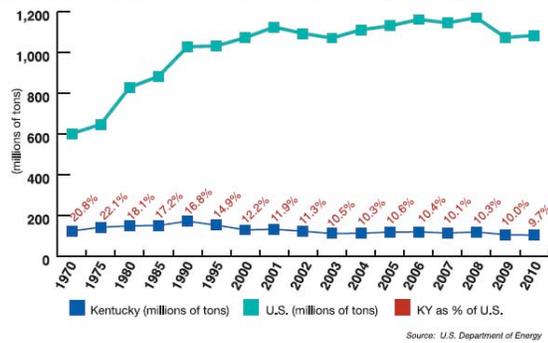
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Coal dominated U.S. power generation for decades because it was a cheap, abundant domestic resource, a recent Associated Press article explained. China today is the world's largest coal producer, but No. 2 America has much bigger reserves – estimated at enough to last another 200-plus years. Fracking, however, has quickly made natural gas abundant domestically also, and even cheaper than coal.

The shifting landscape in coal production and use, especially the cost of environmental compliance, has led to a steady rise in the price Kentucky residents and business pay for electricity.

Kentucky's Share of U.S. Coal Production Shrinking



Because of reliance on coal as a feedstock, over the past decade Kentucky electric rates have risen about 5 percent per year – although actual prices vary widely across the state. From 2010 to 2011, the increase in Kentucky's electric rates was the ninth highest rise in the nation.

At 7.11 cents per kilowatt-hour, Kentucky still has the fourth lowest cost of electricity in the nation, bested only by states with access to significant hydroelectric power. Some states that committed to natural gas for energy production several years ago are now seeing their retail electricity

rates fall, but those are still higher than Kentucky's.

For now. Plans to lower U.S. power plant emissions will mean much higher electric rates for the state, and fewer jobs, especially in mining.

"Current market pressures and a challenging regulatory environment have pushed coal consumption in the United States to a 20-year low," Arch Coal President/CEO John Eaves told [miningweekly.com](#) last month as his company laid off 600 Kentucky miners and another 150 in Virginia and West Virginia. "We had previously streamlined capital spending, idled equipment and reduced shift work."

In addition to job losses, falling coal production is impacting local governments in lower tax revenue. In March 2012, Kentucky coal severance tax revenues were down 26 percent compared to the same month in 2011, and were down 15 percent in April, said Karen Wilson, chief of staff for the state's Department for Energy Development and Independence.

Local governments will have to make do with lower severance tax revenues, which fund many local projects.

"The (state) budget was drawn up with different assumptions on coal tax severance," Wilson said.

Lower coal consumption does not equal lower energy expenses, unfortunately. While energy consumption in Kentucky has remained essentially flat since 2004, overall energy expenditures more than doubled from 2000 to 2010 to \$20 billion annually, according to the Kentucky Energy Database. The increase is due largely to rising transportation fuel prices, which are linked to international oil prices.

Coping with rising rates

Increasing energy rates could impede Kentucky's economic competitiveness in major energy-intensive industries such as automotive and paper manufacturing, and metal smelting, which have a major presence in the state. Experts predict EPA regulations designed to limit emissions of greenhouse gases, mercury and other pollutants will mean additional hikes in coal-fired electric rates and a moratorium on new coal-fired power plants.

"Those states whose portfolio is heavily weighted toward natural gas have an advantage right now," said state DED's Davies.

The cost of complying with the EPA regulations currently slated to go into effect in 2015 could cause retail rates to go up as much as 40 percent, according to Mark Bailey, president/CEO of Henderson-based Big Rivers Electric Corp. In a recent auction of wholesale electricity rates for power supplied to Kentucky in 2015, when the key EPA rules take effect, rose an average of 10 times current prices.

In his testimony before the U.S. House Subcommittee on Energy and Power, Bailey said EPA rules will require as much as \$700 million in additional pollution control equipment for Big Rivers, which serves 113,000 customers in 22 counties.

Among its customers are two aluminum smelters that employ about 5,000 people. Bailey said a rise in electric rates could threaten the future of those industries and jobs.

Some long-time Kentucky energy consultants believe major aluminum and steel production facilities could decide to leave not just the state but the United States in pursuit of lower production costs.

The EPA regulations, however, are aimed at the indirect costs associated with coal.

Compared to natural gas-based generation, according to the Government Accountability Office, coal burning power plants emit 90 times as much acid rain-causing sulfur dioxide, five times as much smog-producing nitrogen oxide and twice as much carbon dioxide, the main so-called greenhouse gas that traps heat in the atmosphere.

Rules the Environmental Protection Agency enacted in the past year tighten limits on sulfur dioxide and nitrogen dioxide emissions, which are linked to heart and lung disease, and put new limits on mercury, a poison found in coal. According to an Associated Press survey of power plant operators, these rules will force somewhere between 32 and 68 coal plants in the country to close as the rules go into effect.

The effect of the regulations on Kentucky's generating capacity could be far reaching. For example, like many other utilities, Louisville Gas & Electric recently announced plans for new generating capacity that will use



Marathon Oil's Catelettsburg Refinery in the northeast corner of Kentucky is the 31st largest in the United States, processing on average about 2 percent of the U.S. oil supply daily. Located on 650 acres at Interstate 64 and U.S. 23, it was built in 1922 by Ashland Refining Co.

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natural gas rather than coal to meet the EPA regulations.

It's not yet clear how much of the cost for building new power-generating capacity will be passed on to consumers and industries.

Meanwhile, the future is still uncertain for the Big Sandy power plant operated by American Electric Power in Louisa. AEP recently withdrew a request to the Public Service Commission to spend \$1 billion to upgrade the plant to meet the 2015 regulations – a cost that would have been passed on to ratepayers in one of the poorest parts of the state.

However, the company has said it may not need the generating capacity from the 49-year-old plant, possibly leading to its closure. The company would have to shut down the plant at least temporarily in any case because it does not have time to install the upgrades prior to the deadline. AEP has announced it will close five of its 21-coal fired plants.

Research pursuing bright ideas

To prepare for this uncertain future, Kentucky has invested in research to increase its energy efficiency as well as technology that would allow coal to remain a vital energy source.

Using American Recovery and Reinvestment Act of 2009 funding, the state has invested about \$68 million in 26 energy-efficiency programs that touched nearly every segment of the commonwealth's economy, including agriculture, manufacturing, construction and education.

"The infusion of that amount of money helped jump start Kentucky and leapfrogged us 10 years in the efficiency area," Davies said.

For instance, the state now has three schools that qualify as near net-zero energy buildings, meaning they produce as much energy as they consume; Richardsville Elementary in Warren County (profiled in *The Lane Report* in December 2010) was the first such school in the nation. Other Kentucky schools are working to meet the government's Energy Star standards for efficiency.

"Communities are finding that building to that standard really doesn't cost much more, but it really helps on an operational basis in reducing their energy costs," Davies said.

The University of Kentucky's Center for Applied Energy Research and the University of Louisville's Conn Center are working on a variety of energy-related projects, separately and together. Some involve energy-efficiency; others focus on alternative energy sources as well as new ways to make coal a more viable energy source in the face of tightening regulations.

For instance, CAER was awarded a U.S. Department of Energy grant to improve carbon-capture systems at coal-fired power plants. The goal is to refine methods to capture carbon from power plant emissions that use as little energy as possible in the process. Other projects include coal-to-liquid conversions and a project to convert coal and biomass into vehicle fuels. A pilot project under way will produce one barrel of fuel a day, according to Rodney Andrews, director of CAER.

In addition, the Kentucky-Argonne Battery Manufacturing Research and Development Center has begun research into developing better ways of constructing, manufacturing and managing lithium-ion batteries used in electric vehicles and other devices that use advanced rechargeable batteries. The U.S. Department of Energy's Chicago-based Argonne National Laboratory entered a unique partnership with UK and UofL in 2009 to create the one-of-a-kind manufacturing R&D site near Lexington.

Such energy-focused research will continue regardless of short-term fluctuations in prices.

"Our focus is utilizing the state's natural resources and continuing to improve the technologies to keep it competitive," Andrews said.

Gary Wollenhaupt is a correspondent for The Lane Report. He can be reached at editorial@lanereport.com.

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