

High-tech power plant is \$5 billion bet on future of coal

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Looming like a spaceship over pine and sweet-gum forest, the high-tech power plant under construction in rural Kemper County is a \$5 billion wager on an energy future that includes coal.

The Kemper plant is scheduled to open this year as the first in the United States to ramp up technology to remove [carbon dioxide](#) emissions on a large scale. If it works as planned, up to 65 percent of the plant's potential [carbon dioxide emissions](#) would be removed, significantly more than the Environmental Protection Agency's proposed requirement of about 40 percent.

But if its progress is any indication, building a [coal](#) plant that can sharply reduce greenhouse gas pollution is a white-knuckle ride. The project is five months behind schedule and more than \$2 billion over budget. The cost overruns have increased electricity bills in southeast Mississippi and contributed to a downgrade in the credit rating outlook for Southern Co., the plant's parent corporation.

The U.S. Energy Department has spent \$270 million on the project - part of \$3.4 billion allocated to carbon-capture demonstration projects since 2009 - yet it remains unclear, according to some analysts, whether the Kemper plant will work as planned.

The carbon-capture plant and four others on the drawing boards are cited by Obama administration officials as evidence that coal can remain part of the president's "all of the above" energy strategy. But many power

companies and environmentalists think the administration's proposed standards for greenhouse gas emissions would all but eliminate new coal [plants](#).

Dalia Patino Echeverri, an assistant professor of energy systems and public policy at Duke University, said the new rules would "put coal at a huge disadvantage," noting that the technology to capture and store carbon dioxide "is still an expensive, uncertain proposition."

Six years into the project, Southern is careful not to tout Kemper as a model that could easily be replicated. "To say there is a one-size-fits-all, that what we do here is applicable someplace else, would probably not be accurate," said Amoi Geter, a spokeswoman for Mississippi Power, the Southern Co. subsidiary building the plant.

In Kemper County, northeast of Jackson, Southern found an unusual cluster of advantages. The plant stands at the mouth of a mine for lignite coal, a cheap fuel. Kemper will use inexpensive treated wastewater in its power generation process. Most importantly, it will make money from the removed carbon dioxide by piping it to two companies that will use it to force oil from old wells.

Coal-fired power plants are the single largest source of heat-trapping carbon dioxide in the United States. In September, the EPA proposed standards for new power plants that would limit carbon dioxide output 1,100 pounds per megawatt hour, down from the current industry average of about 1,800 pounds, a reduction that would require new technology such as that being attempted at Kemper.

Those rules could accelerate the already dramatic shift to [natural gas](#). The price of gas has fallen sharply as hydraulic fracturing, or fracking, has increased supplies, and plants can be built quickly and cheaply.

But natural gas prices have been wildly volatile in the past, and coal prices have historically been low and relatively stable.

"If you think that it's a sound bet that coal will be part of the future of the country, if you have an interest in coal, and companies like Southern do, it makes good business sense to develop technology that lets you use the resource in way that is socially acceptable," said Edward S. Rubin, a professor of engineering and public policy at Carnegie Mellon University.

The 582-megawatt Kemper project will generate enough electricity to serve 189,000 customers. A smaller plant is under construction in Saskatchewan, Canada. About 24 plants around the world are in the planning phase, according to the Carbon Capture and Sequestration Technologies Program at MIT.

Carbon-capture technology is not new. Refineries and some U.S. [power plants](#) have used it on a small scale. Gasified coal, the fuel Kemper will burn, is used at other plants too. But Kemper has a new gasification system. Its operating plan significantly scales up and combines all the technology.

The project was wreathed in high hopes. Former Energy Secretary Steven Chu wrote, "This project is of national importance because it provides a viable option for using our abundant coal resources in a cost-effective and clean manner."

The project was budgeted for \$2.4 billion, or about \$1 billion more than a conventional coal plant. But Kemper's cost ballooned to more than \$5 billion because of changes in design, miscalculations about the amount of materials needed and bad weather that slowed work.

Southern wrote down \$1 billion, but Mississippi Power's customers are

still carrying some costs. The state Legislature passed a law that allows Southern to recoup costs from ratepayers before the plant produces power and another that lets Mississippi Power issue \$1 billion in bonds. Kemper now accounts for about 16 percent of an average monthly residential electric bill.

The fate of the other four planned U.S. carbon-capture plants remains unclear, said Howard J. Herzog, a senior research engineer with the MIT Energy Initiative. The Energy Department is financing between 10 percent and 50 percent of their costs, but construction would have to begin by mid-2015, when the funding runs out.

"There's a realistic chance that one or all may never get built," Herzog said.

Some experts, like Echeverri, believe the price of carbon-capture technology will come down. But the risks of being a trailblazer mean "no one wants to be among the first 10 plants," she said. "If your choice is that you can start a plant with proven technology like a natural gas plant or unproven expensive technology, you will build a gas plant."

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