

# How America's clean coal dream unravelled

Exclusive: Kemper power plant promised to be a world leader in 'clean coal' technology but Guardian reporting found evidence top executives knew of construction problems and design flaws years before the scheme collapsed

Fri 2 Mar 2018 02.00 EST

High above the red dirt and evergreen trees of Kemper County, [Mississippi](#), gleams a 15-story monolith of pipes surrounded by a town-sized array of steel towers and white buildings. The hi-tech industrial site juts out of the surrounding forest, its sharp silhouette out of place amid the gray crumbling roads, catfish stands and trailer homes of nearby De Kalb, population: 1,164.

The \$7.5bn Kemper power plant once drew officials from as far as Saudi Arabia, Japan and Norway to marvel at a 21st-century power project so technologically complex its builder compared it to the moonshot of the 1960s. It's promise? [Energy](#) from "clean coal".

"I'm impressed," [said](#) Jukka Uosukainen, the United Nations director for the Climate Technology Centre and Network, after a 2014 tour, citing Kemper as an example of how "maybe using coal in the future is possible".

## UN Officials Visit Kemper County Energy Facility



UN official visits Kemper in 2014: 'maybe using coal in the future is possible.'

Kemper, its managers claimed, would harness dirt-cheap lignite coal – the world's least efficient and most abundant form of coal – to power homes and businesses in America's lowest-income state while causing the least climate-changing pollution of any fossil fuel. It was a promise they wouldn't keep.

Last summer the plant's owner, Southern Company, America's second-largest utility company, announced it was abandoning construction after years of blown-out budgets and missed construction deadlines.

### ► Q&A

**What is clean coal?**

“It hit us hard,” said Craig Hitt, said executive director of the Kemper County

Economic Development Authority. Some 75 miners, roughly half living inside Kemper County, have already been affected in a region where unemployment is 7.1% compared to a national average of just 4.1%.

“It was going to be the biggest project in the history of the county, possibly in the state of Mississippi,” Hitt said. Instead, this year, Kemper County was home to one of the first large coalmining layoffs of the Trump era.

It’s failure is also likely to have a profound impact on the future of “clean coal”. “This was the flagship project that was going to lead the way for a whole new generation of coal power plants,” said Richard Heinberg, senior fellow at the Post Carbon Institute. “If the initial project doesn’t work then who’s going to invest in any more like it?”

Company officials have blamed the failure on factors ranging from competition from tumbling natural gas prices to bad weather, bad timing and plain old bad luck.

But a review by the Guardian of more than 5,000 pages of confidential company documents, internal emails, white papers, and other materials provided anonymously by several former Southern Co insiders, plus on- and off-record interviews with other former Kemper engineers and managers, found evidence that top executives covered up construction problems and fundamental design flaws at the plant and knew, years before they admitted it publicly, that their plans had gone awry.

Their public statements helped to prolong the notion that their “clean coal” power could be affordable, costing Southern’s customers and shareholders billions, giving false hope to miners and firing dreams that American innovation had provided a path forward for “clean coal” technology at a reasonable price.

## ‘A pony show’

“It was exciting times, but it turned out to be like a mirage,” said Brett Wingo, a former Southern Co engineer who first went public with his concerns about Kemper’s construction delays in a front-page [New York Times investigative report](#) in 2016 and is now suing the company over alleged retaliation. “It was a cool trick – on all of us.”

Kemper’s failure will have a profound impact on international plans to slow climate change which [rely](#) heavily on the rapid development of technology to capture carbon and store it, technology that has so far shown [little progress](#).

The United States has spent hundreds of millions in federal taxpayer funds chasing the chimera of clean coal. Donald Trump has been particularly vocal about his support for clean coal. “We have ended the war on American energy and we have ended the war on beautiful, clean coal,” he said in this year’s State of the Union address.

Kemper promised a way forward. But the documents show that while Southern Co management presented a rosy picture of Kemper’s prospects to the public, numerous structural problems with the project had emerged during construction and internal documents questioned the very foundation of the plant’s viability.

In a 24 April 2013 earnings call, for example, Southern’s CEO Tom Fanning regretted Kemper’s newly announced first budget blowout, a \$540m hike, but described “tremendous progress” on construction and said “the scheduled in-service date” was achievable.

He said most of Kemper’s key components including its distinctive 174ft-tall white dome where coal would be stockpiled was already “in place”.

What was not mentioned was that two months earlier the company had discovered that the dome's cement ceiling had started crumbling due to sloppy workmanship, and by early March had opened up a hole in the ceiling the size of a small house. The crumbling was so severe that the entire dome had to be razed and rebuilt months after Fanning touted its completion.



The dome for storing lignite coal stands next to Southern Co's Kemper County power plant under construction near Meridian, Mississippi, on 25 February 2014. Photograph: Bloomberg/Bloomberg via Getty Images

Several former Southern engineers also explained in interviews that construction workers often lacked the right gaskets, bolts and pipe hangers necessary to connect up Kemper's over 900,000 linear feet of pipes – but managers ordered them to install the piping anyway.

The orders were “just to show work was being done”, one engineer who worked on Kemper said, requesting anonymity because he still works in the tight-knit utility sector, and describing the inoperable maze of pipes as a “pony show” for the state's Public Service Commission.

Bosses pressured engineers to turn in impossible cost and schedule estimates, former construction manager Kelli Williams and Wingo both recounted. They faced strong pressure to alter construction planning documents to fit budget

goals, they said, even if they had strong reasons to doubt workers could actually achieve what the resulting plans required.

These construction snafus and planning pressures help explain how Kemper ballooned from a \$2.4bn construction project to one that cost \$7.5bn.

But Kemper's flaws weren't limited to construction problems. They went right to the heart of the power plant's "clean coal" design.

## **Doubts at the highest levels**

Perhaps the single most important number for a power plant is its availability rate – the percentage of the time can it be up and running versus down for maintenance and repairs. Southern told the federal authorities that achieving 80% availability was a "key performance target" for Kemper, vital to proving that "clean coal" could be affordable.

After construction was under way, Southern Co hired a consultant called World Oil Services to run the numbers again. World Oil concluded Kemper's design meant it could only be up and running on coal just 30-45% of the time during its first three to five years.

A 2 May 2014 in-house analysis also presents availability rates far lower than the company's public numbers, concluding clean coal availability would gradually rise from 25% and not reach its "key" target for nearly a decade.

The figures suggest Southern's plans for running an affordable "clean coal" plant were a pipe dream or, at best, unachievable for a decade. By the time Southern called it quits, Kemper had produced electricity from just coal for only about 100 hours.

Williams, who left the company on good terms and now runs her own construction consulting firm, told the Guardian that World Oil's analysis was

provided to Southern as early as 2012. The company buried World Oil's report, she explained, adding that for years, "trying to find it was like needle-in-a-haystack stuff".

Southern was encouraged to spend big due to a quirk in the way that the power industry is regulated. Monopoly utilities can make money by spending money, because the law allows them to collect a virtually guaranteed percentage of their construction costs as profit. These incentives were supercharged, critics allege, by a [wave of state laws](#) passed in Mississippi and other southern states in the mid-2000s, which allowed utilities to collect reimbursements for construction while projects were still being built, instead of having to wait until construction was finished.

"When I first started, I was told you'll get in as much trouble at this company saving \$5m as you'll get in for spending \$5m," Williams said.

From the start, Mississippi's Public Service Commission agreed that Kemper could be built if the company could keep construction costs below a "soft cap" of \$2.4bn and a "hard cap" of \$2.88bn.

The company repeatedly assured regulators and the public that they were "confident" they could build the plant on budget. But internally there were early doubts at the highest levels even before a single shovel was turned.

Ed Day, CEO of Southern's Mississippi Power subsidiary which oversaw the plant, wrote in a May 4 email about worries he had before construction began

"I am less than full confident about a \$2.8 [bn] cap on Kemper," Ed Day, CEO of Southern's Mississippi Power subsidiary, which oversaw the plant, wrote in a May 4, 2010 email to his closest circle. Day listed numerous reasons he doubted his company could build Kemper within the budget demanded by state regulators. "We had gotten comfortable with a cap of \$3.2[bn] with a

start date of May 1st, but now we don't have a start date.”

The first hint of the real trouble for Kemper came on 15 December 2011 when meeting notes mention the discovery of small “air bubble cracks” in the thick heat-resistant lining inside the power plant's twin hearts, its gasifiers – the units that convert coal into flammable gas in a feat of chemistry requiring temperatures over 1,800F and pressures higher than those at 1,500ft deep in the ocean. To keep that hellish heat and pressure inside, it was vital for the concrete-like insulation lining the steel tank walls to be solid.

Then in February 2012, engineers discovered that the concrete lining inside the gasifier was suffering from “explosive spalling” – laced with tiny pockets of moisture that turned to steam under high heat, causing the concrete shell to pop and crack – and no one could say what had caused the bubbling. “I mean immediately, right there, we knew we had at least a three-to-six-month [schedule] slip when the refractory [lining] failed again,” recalled former Kemper engineer Wingo.

As 10 April 2012, the date when the first piece of the gasifier was scheduled to be lifted into place by a massive crane, rapidly approached engineers still had no clear idea how they would fix the cement insulation.

And if the two gasifiers were late, that would set the entire project behind. Until a gasifier was installed, workers couldn't weld the power plant's steel structure into place around it. And they couldn't lift the blue steel outer shell into place and fix the cracks later.



Cranes stand at the construction site for Southern Co's Kemper County power plant on 25 February 2014.  
Photograph: Bloomberg/Bloomberg via Getty Images

The clock was ticking – at a construction site that engineers were told cost over a million dollars a day just to keep running. Adding to the pressure: Kemper's budget relied on collecting \$133m in federal tax incentives that would be lost if Kemper wasn't up and running by May 2014 – and the company already hadn't left themselves a single day to spare in Kemper's tight schedule.

Meanwhile the Sierra Club environmental group had won a stunning – if short-lived – victory with a lawsuit aimed at overturning Kemper's state permit. On 15 March 2012 the state supreme court in Jackson, Mississippi, ruled in favor of the environmentalists on a technicality and revoked the paperwork Kemper needed to go forward with construction.

“They were completely blindsided,” said Williams. “They had no plan for that to happen.”

Making things even worse, on 2 April, managers had finished running their newest construction budget, numbers that state regulators expected to be handed over in about a month, and Kemper was already just \$15m shy of its

\$2.88bn budget cap – not counting the mounting million-dollar-a-day costs of the gasifier delays.

That was a huge problem. “If the Public Service Commission knew costs were running over \$2.8bn,” said Charles Grayson, a fiscal conservative whose Bigger Pie Forum has long opposed Kemper on financial grounds, “they would have had to scrap the whole project right there.”

Throughout April, Kemper’s management scrambled to find ways to slash costs, at least on paper. “They gave us goals like, take \$50m out, take \$200m out,” said Williams. But with even small budget cuts, company files warned of a “severe risk” of missing the 2014 construction deadline.

Some relief for the company finally came on 24 April, when state regulators re-issued Kemper’s paperwork, circumventing the Sierra Club ruling – but they again insisted on a \$2.88bn “hard cap” for the budget. And Southern assured the regulators they could stay under that line.

Matters came to a head at a 30 April executive review board meeting, which included Fanning. The documents show the executive review board was presented with a long list of risks associated with whittling Kemper’s official budget down from \$2.865bn, and a presentation points out in bold that the impacts of construction delays were left out (which would drive costs up).

Fanning made his call: the next month the company told regulators again that it would stay under budget. But key information was not passed on. On 8 May, general manager Steve Owen sent an email to his staff requesting detailed spreadsheets for his upcoming independent monitor presentation “without any reference to the April 2, 2012 base reforecast”, which suggested the plant would bust its budget.

State regulators smelled something amiss and demanded an audit, which was

conducted by Burns and Roe Enterprises, an engineering firm.

Excerpt from the audit by Burns and Roe

The audit's 15 August 2012 draft report was damning, citing concerns over a subcontractor's "lack of internal project controls", concluding that "[c]ompany statuses are optimistic" about design, engineering and construction progress, and describing delays at a Chinese project designed around the same technology as Kemper.

But auditors allowed Southern to extensively comment on that draft, watering down its conclusions and delaying its publication until November 2012 – continuing construction in the meantime.

In April 2013, the company told regulators there had been a fight inside Southern, pitting those who projected Kemper would cost as much as \$2.865bn (crucially just shy of the hard cap), against Ed Day and Tommy Anderson at Mississippi Power Company, who insisted it could be built for \$2.49bn.

"Stark differences, albeit with very logical bases, were presented and maintained by both sides and neither appeared willing to budge significantly from their initial positions," the company wrote, around the time that Ed Day and Tommy Anderson, who ran Southern's subsidiary Mississippi Power, resigned. "As a result, no set of assumptions and no point estimate were agreed upon."

It wasn't until May, Mississippi Power explained, that they had concluded that Kemper would cost somewhere in-between, reaching \$2.76bn. In documents later presented to state regulators, Southern offered up a 4 April chart showing a \$2.7bn projection with a 95% probability of staying below \$2.865bn.



Employees work along the gas lines of the Mississippi Power Co carbon capture plant in DeKalb, Mississippi, on 16 November 2015. Photograph: Rogelio V. Solis/AP

## **‘We made a mistake’**

Southern’s subsidiary, Mississippi Power, was forced to admit that it had been wrong to take so long to provide regulators with an explanation – but their internal documents show that back in 2012, when its current state certificate was issued, Southern knew much more than it has ever publicly admitted.

“There was no intentional withholding of information,” Mississippi Power’s new CEO, Ed Holland, told the Associated Press in 2013, as Ed Day’s resignation was made public.

“We made a mistake of not delivering in a timely fashion,” Holland added, which was widely read as admitting the company was late reporting its \$366m bump from \$2.4bn up to the \$2.76bn estimate. By June 2017 the gig was up. Costs had spiraled to \$7.5bn and the company had revealed that equipment still required costly repairs.

Southern announced in August that it would recognize an additional \$2.8bn

loss as it suspended construction at Kemper, meaning that the company's shareholders have largely borne the brunt of the project's final costs.

Asked for comment, Southern declined to respond to specific questions. Schuyler Baehman, a Southern Co spokesman, instead pointed to a 6 February settlement over Kemper's costs and recent tax law changes, which he said would reduce customers' bills. "We look forward to the continued operation of Kemper's efficient natural gas facility," Baehman wrote, "which has been reliably serving Mississippi Power customers for more than three years."

The abandonment of clean coal at Kemper this summer may have long-running ramifications for the international response to climate change. It was slated to be the world's largest coal carbon capture plant, touted as potentially the first of many similar projects around the world, and the only built-from-the-ground-up coal plant with carbon capture included right from the drawing board.

If Kemper ran aground due to fundamental design flaws rather than poor market timing or mishaps that could be avoided next time, then the prospects for affordable clean coal and carbon capture may be even more distant than many countries are counting on to meet international climate agreements.

Instead of delivering the promise of clean coal Kemper has shattered them, in the meantime leaving locals out of work and shareholders out of pocket.

"We told them years ago that this was a facade," said Louie Miller, director of the Mississippi chapter of the Sierra Club. "I think there's going to be a big scrap metal sale at some point."

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