

DRILLING DOWN

## Insiders Sound an Alarm Amid a Natural Gas Rush



Jennifer Pitts/The Journal Record, via Associated Press, left; Mark Perstein for The New York Times

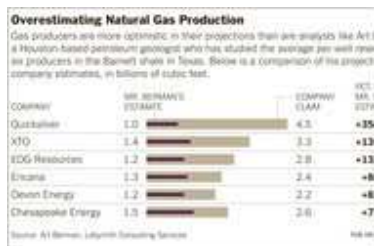
"It's time to get bullish on natural gas," said Aubrey K. McClendon, left, chief executive of Chesapeake Energy. "This could have profound consequences for our local economy," said Deborah Rogers, a committee member at the Federal Reserve Bank of Dallas.

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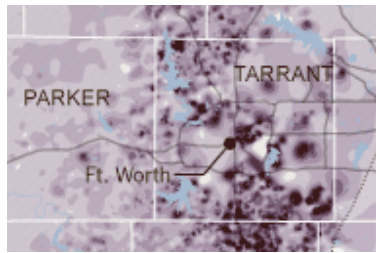
Natural gas companies have been placing enormous bets on the wells they are drilling, saying they will deliver big profits and provide a vast new source of energy for the United States.

Documents: Leaked Industry E-Mails and Reports



Graphic

Overestimating Natural Gas Production



Graphic

Sweet Spots, But Not Many

## Drilling Down

*Natural Gas Investments*

Articles in this series will examine the risks of natural-gas drilling and efforts to regulate this rapidly growing industry.

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Brandon Thibodeaux for The New York Times

Ministers, pastors and deacons of Fort Worth churches. Dozens of black churches in Fort Worth signed gas leases.

But the gas may not be as easy and cheap to extract from shale formations deep underground as the companies are saying, according to [hundreds of industry e-mails and internal documents](#) and an analysis of data from thousands of wells.

In the e-mails, energy executives, industry lawyers, state geologists and market analysts voice skepticism about lofty forecasts and question whether companies are intentionally, and even illegally, overstating the productivity of their wells and the size of their reserves. Many of these e-mails also suggest a view that is in stark contrast to more bullish public comments made by the industry, in much the same way that insiders have raised doubts about previous financial bubbles.

“Money is pouring in” from investors even though shale gas is “inherently unprofitable,” an analyst from PNC Wealth Management, an investment company, [wrote to a contractor in a February e-mail](#). “Reminds you of dot-coms.”

“The word in the world of independents is that the shale plays are just giant Ponzi schemes and the economics just do not work,” an analyst from IHS Drilling Data, an energy research company, [wrote in an e-mail on Aug. 28, 2009](#).

Company data for more than 10,000 wells in three major shale gas formations raise further questions about the industry’s prospects. There is undoubtedly a vast amount of gas in the formations. The question remains how affordably it can be extracted.

The data show that while there are some very active wells, they are often surrounded by vast zones of less-productive wells that in some cases cost more to drill and operate than the gas they produce is worth. Also, the amount of gas produced by many of the successful wells is falling much faster than initially predicted by energy companies, making it more difficult for them to turn a profit over the long run.

If the industry does not live up to expectations, the impact will be felt widely. Federal and state lawmakers are considering drastically increasing subsidies for the natural gas business in the hope that it will provide low-cost energy for decades to come.

But if natural gas ultimately proves more expensive to extract from the ground than has been predicted, landowners, investors and lenders could see their investments falter, while consumers will pay a price in higher electricity and home heating bills.

There are implications for the environment, too. The technology used to get gas flowing out of the ground — called hydraulic fracturing, or hydrofracking — can require over a million gallons of water per well, and some of that water must be disposed of because it becomes contaminated by the process. If shale gas wells fade faster than expected, energy companies will have to drill more wells or hydrofrack them more often, resulting in more toxic waste.

The e-mails were obtained through open-records requests or provided to The New York Times by industry consultants and analysts who say they believe that the public perception of shale gas does not match reality; names and identifying information were redacted to protect these people, who were not authorized to communicate publicly. In the e-mails, some people within the industry voice grave concerns.

“And now these corporate giants are having an Enron moment,” a retired geologist from a major oil and gas company [wrote in a February e-mail](#) about other companies invested in shale gas. “They want to bend light to hide the truth.”

Others within the industry remain optimistic. They argue that shale gas economics will improve as the price of gas rises, technology evolves and demand for gas grows with help from increased federal subsidies being considered by Congress. “Shale gas supply is only going to increase,” Steven C. Dixon, executive vice president of Chesapeake Energy, said at an energy industry conference in April in response to skepticism about well performance.

### **Studying the Data**

“I think we have a big problem.”

Deborah Rogers, a member of the advisory committee of the Federal Reserve Bank of Dallas, recalled saying that in a May 2010 conversation with a senior economist at the Reserve, Mine K. Yucel. “We need to take a close look at this right away,” she added.

A former stockbroker with Merrill Lynch, Ms. Rogers said she started studying well data from shale companies in October 2009 after attending a speech by the chief executive of Chesapeake, Aubrey K. McClendon. The math was not adding up, Ms. Rogers said. Her research showed that wells were petering out faster than expected.

“These wells are depleting so quickly that the operators are in an expensive game of ‘catch-up,’” Ms. Rogers wrote in an e-mail on Nov. 17, 2009, to a petroleum geologist in Houston, who wrote back that he agreed.

“This could have profound consequences for our local economy,” she explained in the e-mail.

Fort Worth residents were already reeling from the sudden reversal of fortune for the natural gas industry.

In early 2008, energy companies were scrambling in Fort Worth to get residents to lease their land for drilling as they searched for so-called monster wells. Billboards along the highways stoked the boom-time excitement: “If you don’t have a gas lease, get one!” Oil and gas companies were in a fierce bidding war for drilling rights, offering people bonuses as high as \$27,500 per acre for signing leases.

The actor Tommy Lee Jones signed on as a pitchman for Chesapeake, one of the largest shale gas companies. “The extremely long-term benefits include new jobs and capital investment and royalties and revenues that pay for public roads, schools and parks,” he said

in one television advertisement about drilling in the Barnett shale in and around Fort Worth.

To investors, shale companies had [a more sophisticated pitch](#). With better technology, they had refined a “manufacturing model,” they said, that would allow them to drop a well virtually anywhere in certain parts of a shale formation and expect long-lasting returns.

For Wall Street, this was the holy grail: a low-risk and high-profit proposition. But by late 2008, the recession took hold and [the price of natural gas plunged](#) by nearly two-thirds, throwing the drilling companies’ business model into a tailspin.

In Texas, the advertisements featuring Mr. Jones disappeared. Energy companies rescinded high-priced lease offers to thousands of residents, which prompted class-action lawsuits. Royalty checks dwindled. Tax receipts fell.

The impact of the downturn was immediate for many.

“Ruinous, that’s how I’d describe it,” said the Rev. Kyev Tatum, president of the Fort Worth chapter of the Southern Christian Leadership Conference.

Mr. Tatum explained that dozens of black churches in Fort Worth signed leases on the promise of big money. Instead, some churches were told that their land may no longer be tax exempt even though they had yet to make any royalties on the wells, he said.

That boom-and-bust volatility had raised eyebrows among people like Ms. Rogers, as well as energy analysts and geologists, who started looking closely at the data on wells’ performance.

In May 2010, the Federal Reserve Bank of Dallas called a meeting to discuss the matter after prodding from Ms. Rogers. One speaker was Kenneth B. Medlock III, an energy expert at Rice University, who described a promising future for the shale gas industry in the United States. When he was done, Ms. Rogers peppered him with questions.

Might growing environmental concerns raise the cost of doing business? If wells were dying off faster than predicted, how many new wells would need to be drilled to meet projections?

Mr. Medlock conceded that production in the Barnett shale formation — or “play,” in industry jargon — was indeed flat and would probably soon decline.

“Activity will shift toward other plays because the returns there are higher,” he predicted. Ms. Rogers turned to the other commissioners to see if they shared her skepticism, but she said she saw only blank stares.

### **Bubbling Doubts**

Some doubts about the industry are being raised by people who work inside energy companies, too.

“Our engineers here project these wells out to 20-30 years of production and in my mind that has yet to be proven as viable,” wrote a geologist at Chesapeake in [a March 17 e-mail](#) to a federal energy analyst. “In fact I’m quite skeptical of it myself when you see the % decline in the first year of production.”

“In these shale gas plays no well is really economic right now,” the geologist said in [a previous e-mail to the same official on March 16](#). “They are all losing a little money or only making a little bit of money.”

Around the same time the geologist sent the e-mail, Mr. McClendon, Chesapeake’s chief executive, told investors, “It’s time to get bullish on natural gas.”

In September 2009, a geologist from ConocoPhillips, one of the largest producers of natural gas in the Barnett shale, warned in [an e-mail to a colleague](#) that shale gas might end up as “the world’s largest uneconomic field.” About six months later, the company’s chief executive, James J. Mulva, described natural gas as “nature’s gift,” adding that “rather than being expensive, shale gas is often the low-cost source.” Asked about the e-mail, John C. Roper, a spokesman for ConocoPhillips, said he absolutely believed that shale gas is economically viable.

A big attraction for investors is the increasing size of the gas reserves that some companies are reporting. Reserves — in effect, the amount of gas that a company says it can feasibly access from its wells — are important because they are a central measure of an oil and gas company’s value.

Forecasting these reserves is a tricky science. Early predictions are sometimes lowered because of drops in gas prices, as happened in 2008. Intentionally overbooking reserves, however, is illegal because it misleads investors. Industry e-mails, mostly from 2009 and later, include language from oil and gas executives questioning whether other energy companies are doing just that.

The e-mails do not explicitly accuse any companies of breaking the law. But the number of e-mails, the seniority of the people writing them, the variety of positions they hold and the language they use — including comparisons to Ponzi schemes and attempts to “con” Wall Street — suggest that questions about the shale gas industry exist in many corners.

“Do you think that there may be something suspicious going with the public companies in regard to booking shale reserves?” a senior official from Ivy Energy, an investment firm specializing in the energy sector, wrote in [a 2009 e-mail](#).

[A former Enron executive wrote in 2009](#) while working at an energy company: “I wonder when they will start telling people these wells are just not what they thought they were going to be?” He added that the behavior of shale gas companies reminded him of what he saw when he worked at Enron.

Production data, provided by companies to state regulators and reviewed by The Times, show that many wells are not performing as the industry expected. In three major shale formations — the Barnett in Texas, the Haynesville in East Texas and Louisiana and the Fayetteville, across Arkansas — less than 20 percent of the area heralded by companies as productive is emerging as likely to be profitable under current market conditions, according to the data and industry analysts.

Richard K. Stoneburner, president and chief operating officer of Petrohawk Energy, said that looking at entire shale formations was misleading because some companies drilled only in the best areas or had lower costs. “Outside those areas, you can drill a lot of wells that will never live up to expectations,” he added.

Although energy companies routinely project that shale gas wells will produce gas at a reasonable rate for anywhere from 20 to 65 years, these companies have been making such predictions based on limited data and a certain amount of guesswork, since shale drilling is a relatively new practice.

Most gas companies claim that production will drop sharply after the first few years but then level off, allowing most wells to produce gas for decades.

Gas production data reviewed by The Times suggest that many wells in shale gas fields do not level off the way many companies predict but instead decline steadily.

“This kind of data is making it harder and harder to deny that the shale gas revolution is being oversold,” said Art Berman, a Houston-based geologist who worked for two decades at Amoco and has been one of the most vocal skeptics of shale gas economics.

The Barnett shale, which has the longest production history, provides the most reliable case study for predicting future shale gas potential. The data suggest that if the wells’ production continues to decline in the current manner, many will become financially unviable within 10 to 15 years.

A review of more than 9,000 wells, using data from 2003 to 2009, shows that — based on widely used industry assumptions about the market price of gas and the cost of drilling and operating a well — less than 10 percent of the wells had recouped their estimated costs by the time they were seven years old.

Terry Engelder, a professor of geosciences at Pennsylvania State University, said the debate over long-term well performance was far from resolved. The Haynesville shale has not lived up to early expectations, he said, but industry projections have become more accurate and some wells in the Marcellus shale, which stretches from Virginia to New York, are outperforming expectations.

### **A Sense of Confidence**

Many people within the industry remain confident.

“I wouldn’t worry about these shale companies,” said T. Boone Pickens, the oil and gas industry executive, adding that he believes that if prices rise, shale gas companies will make good money.

Mr. Pickens said that technological improvements — including hydrofracking wells more than once — are already making production more cost-effective, which is why some major companies like ExxonMobil have recently bought into shale gas.

Shale companies are also adjusting their strategies to make money by focusing on shale wells that produce lucrative liquids, like propane and butane, in addition to natural gas.

Asked about the e-mails from the Chesapeake geologist casting doubt on company projections, a Chesapeake spokesman, Jim Gipson, said the company was fully confident that a majority of wells would be productive for 30 years or more.



David Pendery, a spokesman for IHS, added that though shale gas prospects had previously been debated by many analysts, in more recent years costs had fallen and technology had improved.

Still, in private exchanges, many industry insiders are skeptical, even cynical, about the industry's pronouncements. "All about making money," an official from Schlumberger, an oil and gas services company, wrote in [a July 2010 e-mail](#) to a former federal regulator about drilling a well in Europe, where some United States shale companies are hunting for better market opportunities.

"Looks like crap," the Schlumberger official wrote about the well's performance, according to the regulator, "but operator will flip it based on 'potential' and make some money on it."

"Always a greater sucker," [the e-mail](#) concluded.

*Robbie Brown contributed reporting from Atlanta.*