



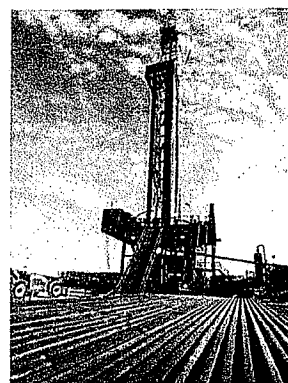
Exxon's big bet on shale gas

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America's most profitable company now produces about as much natural gas as it does oil. CEO Rex Tillerson thinks the fracking party has just begun.

By *Brian O'Keefe*, assistant managing editor

FORTUNE -- For Rex Tillerson fracking is more than a revolutionary approach to drilling oil and gas -- it's part of his personal history. Simply mention the word to the CEO of Exxon Mobil (XOM) and he starts reminiscing about his days as a young engineer. It was 1976, and Tillerson had been sent to East Texas for his second assignment at the company. His job was to follow around rigs drilling for natural gas and "complete" the wells. That meant experimenting with a process known as hydraulic fracturing, or fracking. By pumping water, sand, and chemicals down into a well at high pressure, he could cause cracks in the stone where the gas was trapped and allow more of it to flow.



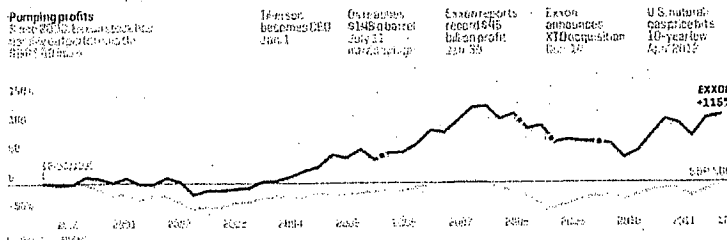
Drill pipe ready for use on a rig at Exxon's Johnson Ranch site outside Fort Worth

That winter Tillerson practically lived out of the back of his car, driving to the company's district office in Tyler at night so he could run punch-card decks through the computer to design his new fracking programs. Out in the field, when the temperature dropped and the wind blew, the then 24-year-old engineer was grateful for the shelter provided by the big diesel engines that powered the water pumps. "I would stand between those big fracking tanks to stay warm, because the water's heated," says Tillerson in a rare interview, laughing at the memory. "I'd stay there until they were ready to crank those babies up, and then I'd have to go out into the weather."

What's warming his heart today is the shale gas revolution that technology has enabled. In fact, Tillerson is betting much of his company's future growth -- and a good portion of his legacy -- on the promise of fracking. Two years ago Tillerson engineered a \$35 billion acquisition of natural-gas producer XTO Energy in large part to buy the company's hydraulic-fracturing expertise. It is easily the largest deal the energy giant has done since the \$88 billion mega-merger with Mobil orchestrated by Tillerson's predecessor, Lee Raymond, in 1999.

In buying XTO, the 60-year-old Tillerson has further reshaped the company. In 2011, Exxon reported sales of \$486 billion -- a gargantuan number that could vault it past Wal-Mart (WMT) to recapture the No. 1 position in this year's Fortune 500. The \$41 billion in profit it earned was the second-largest total in corporate history, behind only the \$45 billion record that Exxon set in 2008. Those astronomical earnings have been driven by persistently high oil prices. But today Exxon, the prototypical oil giant, gets about 50% of its production from, and has 50% of its reserves in, natural gas. The company's stock has risen 77% since Tillerson became CEO at the beginning of 2006, compared with 29% for the S&P 500 index (SPX). To deliver the future returns that its shareholders expect, Exxon needs the XTO purchase -- which so far hasn't lived up to its promise because of falling natural-gas prices -- to pay off bigtime. Tillerson has good reason to believe it will.

Over the past several years fracking has unlocked a vast new source of energy supply in the U.S. Advanced forms of the process that Tillerson used in the 1970s, combined with innovative methods of drilling, have enabled energy companies to extract huge quantities of natural gas and oil trapped in shale rock -- assets that were previously thought to be either impossible or uneconomic to produce. Production from large shale deposits, or "plays," such as the Barnett in Texas, the Haynesville in East Texas and Louisiana, and the vast Marcellus in the Northeast, has surged.



This shale gas boom has turned assumptions about the future of the U.S. and global energy picture upside down. Less than a decade ago the consensus was that America was beginning to run out of economically recoverable natural gas and that the country would need to import vast quantities of it from overseas. Now we're awash in natural gas. U.S. production has increased 28% since 2005. In 2011 about a third of that production was from shale gas, up from just 11% in 2008. By 2035, according to a study by the research firm IHS Global Insight, shale gas will account for 60% of U.S. production.

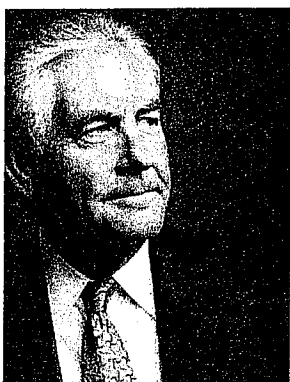
HOUSE ENERGY AND UTILITIES

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It is widely thought that the U.S. now has 100 years or more of domestic gas supply at current consumption rates. Already there has been a frenzy of exploration. The shale gas industry employed more than 600,000 workers in the U.S. in 2010, according to IHS, and by 2015 it will contribute some \$118 billion to the U.S. economy. (For more on the economic ramifications of this boom, see "America's New Job Machine Is Heating Up.") Large shale deposits in South America, China, and Europe mean that it should eventually be a global trend as well. The International Energy Agency estimates that the world currently has a 250-year supply of natural gas. "In my 50 years of following the energy business, this is by far the biggest event that I've seen," says John Deutch, an MIT professor and a former CIA director who last year chaired a Department of Energy subcommittee on shale gas.

The surge in shale gas production has happened so quickly that drilling activity has raced ahead of regulators and public understanding. Fracking has become a dirty word to many -- almost a catch-all term for concerns about the consequences of a new onshore exploration boom in the U.S. that has reached into areas previously untouched by the energy industry. Environmentalists have raised concerns about contamination of freshwater aquifers, pollution from truck traffic, increased greenhouse gas emissions, and even earthquakes. It didn't help fracking's reputation that *Gasland*, a 2010 Oscar-nominated documentary about the dangers of shale drilling, caught the public's attention with its footage of contaminated tap water that could be lit on fire, though the veracity of some of the film's content was later challenged.

Still, if there is a single factor that could slow shale gas development, it's environmental backlash. Already New York (which potentially has a lot of Marcellus Shale gas) and New Jersey (which probably doesn't) have temporarily banned fracking. Both France and Germany have imposed moratoriums on shale gas drilling. And in November, the Environmental Protection Agency released a 190-page report explaining how it plans to conduct a study of the impact of shale gas on drinking water that should be ready by 2014. Meanwhile, the shale gas industry continues to boom.



Exxon CEO Rex Tillerson

Tillerson brushes aside environmental concerns as manageable and overblown. He regards the shale surge as unambiguously good news for the U.S. and the world, the latest triumph for an industry that periodically invents new ways to find and harness fossil fuels from the earth. "The most important thing for people to understand about shale gas is it's just yet the next big resource opportunity for us," he says. "The world's economy has a voracious appetite for energy, so thank God we can do this."

But the growth of shale gas is also, he believes, part of a larger narrative as the world shifts to a greater reliance on so-called unconventional resources -- and we are at a decisive moment. To understand this transition, it's important to examine why the country's largest energy company is staking part of its future on shale and how it plans to make the most of its new resources.

It's just after noon on a windy Tuesday in southeastern Oklahoma, and the rig at XTO Energy's Gayle 1-32H well is about to breach the Woodford Shale at a depth of 11,700 feet after 38 straight days of 24-hour drilling. Inside the kitchen of the doublewide that serves as both office and bunk for the crew, a group of XTO drilling and production supervisors are eating banana pudding out of paper cups and discussing the geological plan for the well. A monitor nearby shows the drilling progress in real time. A TV has *Criminal Minds* on mute.

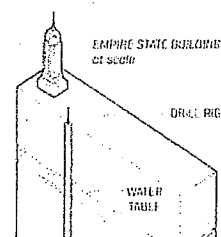
This is Singing Cowboy country. Gene Autry himself grew up nearby, and the area has always had a lot of ranching. Now Ardmore, the biggest municipality in the area, is experiencing a classic mining-town boom. The hotels are booked. The Wal-Mart is always busy. XTO has just started building a new two-story regional office off the Ardmore exit of I-35, and it's already considering an expansion.

The rig at the Gayle well is a state-of-the-art piece of equipment that is drilling its first hole. It cost \$18 million to build, and XTO has contracted it for three years at a cost of \$24,000 per day. It's one of 12 rigs the company has running full-time in the Woodford right now. The company has 65 wells in the area, but it's now drilling at a pace to finish about 130 wells per year. "We're stepping things up here," says Guy Haykus, XTO's regional production supervisor. "Right now this is a limelight area."

The Woodford holds a particular appeal for XTO and other shale drillers today because it produces a lot of "wet" gas. Regular natural gas, or "dry" gas, is mostly methane. That's what we use to fuel our stoves, heat our homes, and generate power at utility plants. But the price of dry gas has tumbled. Over the past decade, it has averaged \$5.78 per million BTUs. Recently it fell below \$2. Exxon and other companies have been shifting rigs to areas that produce a more complicated mix of hydrocarbons that includes "wet" natural-gas liquids such as ethane, propane, and butane. Those liquids are used as chemical feedstock or as additives in gasoline, and they fetch a higher price than methane right now.

After the drill enters the Woodford, the crew at the Gayle site will slowly turn it sideways and then drill horizontally for another 5,000 feet through the shale. That makes it possible to hydraulically fracture a large section of rock from a single well. (See "How Fracking Works" graphic to the right.) It's the combination of horizontal drilling with fracking that has enabled the massive growth of shale gas production.

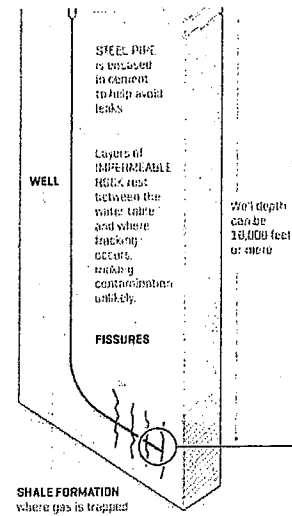
The shale gas revolution began almost right underneath Exxon's feet. In the early 1980s a visionary, independent natural-gas driller named George Mitchell began experimenting with ways to get gas out of the Barnett Shale, which ranges all across the Dallas-Fort Worth



area -- even under Exxon's headquarters in Irving, Texas. Geologists have always known that shale contains trapped gas and oil. In fact, shale is the deep layer of rock where much of the traditional natural-gas supply was "cooked." But extracting hydrocarbons from the rock was thought to be too difficult and expensive to justify.

Mitchell, however, was convinced it could work. After nearly 20 years of trial and error, Mitchell Energy developed a formula for fracking with water and sand that worked spectacularly well. The company's production of natural gas in the Barnett soon spiked. In 2002, Mitchell, then 82, sold his company to Devon Energy (DVN) for \$3.2 billion. Devon was able to combine its expertise in horizontal drilling with Mitchell's fracking techniques and boost production even more. Soon Devon and other companies were pulling huge amounts of gas out of the Barnett.

Exxon was a little slow to recognize the magnitude of what was happening right on its doorstep. Not long after he became CEO in 2006, Tillerson decided to investigate. He formed a joint venture with an independent driller in the Barnett and leased a bunch of acreage. "I said, 'All right. Go out and develop a position, and my primary objective is I want to understand this, and I want to learn about it,'" says Tillerson. After about a year he sold off the assets. But the Exxon CEO had learned a couple of important things: First, that shale gas was going to be significant. And second, that Exxon was late to the party. Most of the best acreage in the established plays had already been leased, driving up prices.



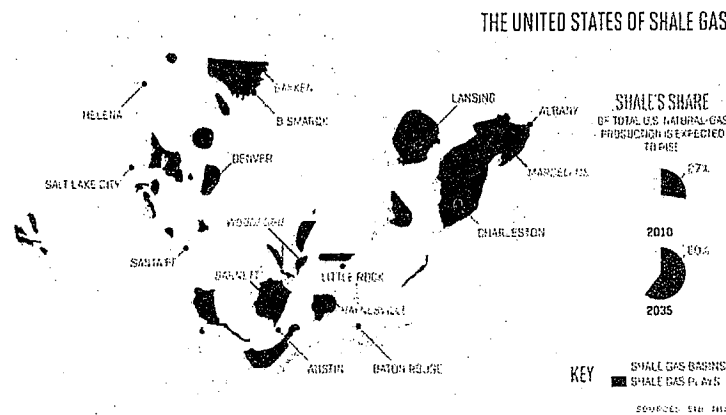
CLICK ON THE IMAGE FOR MORE ON HOW FRACKING WORKS

In July 2009, Tillerson got a call from the Jefferies & Co. oil and gas banker Jack Randall, an old friend from the marching band at the University of Texas. (Tillerson played the drums, and Randall the trumpet.) Randall, a member of the board of XTO Energy of Fort Worth, told Tillerson that XTO chairman Bob Simpson was interested in selling the company. XTO was an early player in the Barnett and had grown into the largest natural-gas producer in the U.S. Tillerson and Simpson began negotiating, and on Dec. 14, 2009, they announced a \$41 billion all-stock acquisition of XTO by Exxon, with a 25% premium for XTO shareholders. The deal got a mixed reception from Wall Street. By the time it closed, a dip in Exxon's stock price had pushed the value down to \$35 billion.

Tillerson felt a bold move was justified. "The strategic decision I made was, Okay, we're going to enter this wholeheartedly, and we want a big position now," says Tillerson. "We can build it, and it will take several years for us to get to a material position. Or we can buy it." One factor in favor of buying it was that shale drilling is extremely labor-intensive compared with traditional oil and gas development. Rather than poking a hole in a big reservoir and letting the crude flow, shale development requires repeated drilling and fracking to unlock gas from new corners of a play. To Tillerson, retaining XTO's field engineers and executives, and their knowledge of shale development, would be key to making the merger successful.

That imperative led the company to take a new approach to integrating XTO. Traditionally Exxon has been known for snapping up companies for their underlying assets and forcing its own ruthlessly efficient culture on the conquered. This was very different. Tillerson made it quite clear from the beginning that XTO would retain its own identity, and that, in fact, Exxon would be learning a thing or two from its new addition. He even coined a phrase for the process: reverse integration. Evidence of the subsidiary's continued autonomy was obvious at the drill site in Oklahoma. The engineers at the Woodford site wore XTO-branded hard hats, and their business cards said nothing about Exxon.

Since the acquisition, XTO's proven shale gas reserves have increased 81%, through a combination of strategic acquisitions and development of existing acreage, to 82 trillion cubic feet -- enough to meet demand in the Dallas-Fort Worth area for 150 years. "Exxon made a bet on natural gas, and so far they are underwater, because the price of gas in the U.S. has collapsed," says Fadel Gheit, the longtime Oppenheimer energy analyst. "That doesn't mean that they are wrong, because their investment horizon is not the same as Wall Street's."



Tillerson believes that the shale investments will pay off for Exxon over 25 to 30 years, a point he emphasized to analysts in March when explaining the company's careful approach to developing its shale assets. "Now, that is not the same model that all the other players out there would follow because they don't have the size," he said. "They don't have the technology

resources, the research resources standing behind them. They don't have the financial resilience." He added, "We can be patient."

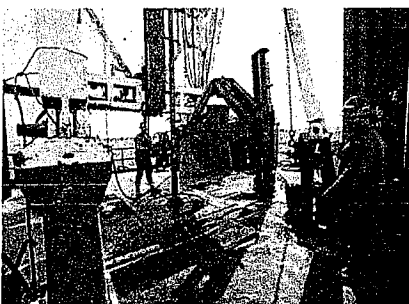
Why is Tillerson so confident in the future of natural gas? In December, Exxon released its annual "Outlook for Energy," which is the company's view of future demand and consumption trends out to the year 2040. The biggest single theme in the research, which Exxon uses to guide its strategic planning, was the growing demand for electricity. Exxon estimates that worldwide electricity demand will increase 80% by 2040 as hundreds of millions in the developing world achieve a middle-class lifestyle. An increasing amount of that electricity will be generated by natural gas, which will pass coal as the world's second-largest fuel source, behind crude oil, by 2025.

Exxon has been preparing to meet the emerging demand for natural gas for some time. In Qatar, which has huge natural-gas reserves in its offshore North Field, the company has invested heavily in facilities to produce and export liquefied natural gas, which is supercooled and transported in massive tankers. The company has a \$15.7 billion LNG project in Papua New Guinea that will begin supplying gas in 2014 to customers in Asia. And Exxon is also a partner in the massive, Chevron-led, \$37 billion Gorgon LNG project in Australia.

Over the next five years Exxon plans to invest \$185 billion in its business, most of it to explore for and develop new sources of oil and gas. The cost of the "next barrel" is on the rise, says Tillerson, as easy-to-access reservoirs are depleted. The company believes that deepwater projects will yield huge production gains in coming decades. It is working on a partnership to explore the Arctic and the Black Sea with Russian oil giant Rosneft, and last October it signed a deal to explore for oil in Kurdistan. But it's also counting on robust growth from unconventional new sources such as oil sands, tight oil, and, of course, shale gas.

Just how much shale gas the U.S. has is a matter of some debate. The most common refrain, and one that President Obama used in his State of the Union speech, is that we now have 100 years of natural-gas supply in the U.S. from shale. That is based on a report issued last year by an industry organization called the Potential Gas Committee. But skeptics have pointed out that much of that total is "unproven." Because the development of shale is relatively new, most of the potential supply has yet to be fully explored. While it's certainly possible that some shale plays will turn out to be less rich than hoped, it's also possible that improving technology will allow Exxon and other drillers to extract even more than we can imagine today.

With his silver hair, dark suits, and deep Texas drawl, Tillerson is the very picture of a big oil executive. In person, he comes across as relaxed and extremely comfortable in his own skin. Until, that is, the subject of environmental concerns and the media coverage of the shale gas boom comes up. Then suddenly his temper flashes. "I think we have to deal in facts," he says, his voice rising. "The assertions that our opponents make -- why don't you ask them to produce some facts, produce something? I mean, prove it."



The U.S. shale gas industry employs some 600,000 workers, like these Texas roughnecks.

Tillerson believes the discourse about shale has been hijacked and distorted. He says that Exxon is transparent about its practices and points out, for instance, that the company was an early proponent of disclosing the chemicals that it uses in fracking. He argues that shale drillers are being held to an unrealistic safety standard. "What's happened is the tables have been turned around now to where we have to prove it's not going to happen," he says. "Well, that is a very dangerous exchange to get into because where it leads you from a regulatory and policy standpoint is to govern by the precautionary principle. And the precautionary principle will absolutely undermine the economy." He adds, "If you want to live by the precautionary principle, then crawl up in a ball and live in a cave."

It's true that attacks on fracking have at times veered into fear-mongering territory. But shale drillers have often met legitimate claims of problems with defiance -- and caused themselves more trouble in the process. "Unfortunately, the industry's response too often has been just to argue that hydraulic fracturing can't possibly cause any problems," says Fred Krupp, president of the Environmental Defense Fund and a member of the Energy Department's shale gas subcommittee last year. "When that kind of denial meets real and actual issues, the disconnect results in a lot of anger. And it erodes trust."

It has also led to some resistance from shareholders. An advocacy group called As You Sow, representing a coalition of green-oriented investors, has proposed a shareholder resolution calling for Exxon to issue a report on the risks associated with its development of shale gas. In late March the Securities and Exchange Commission rejected a request from Exxon to exclude a vote on the resolution at its annual meeting in May. (A similar resolution last year garnered 28% of votes cast.) In its letter to the SEC, Exxon said that it was not subject to any fines or government-enforcement actions related to hydraulic fracturing. That may be true if you consider only the process of fracking itself, which happens deep underground. But a search of Pennsylvania's Department of Environmental Protection database shows that last year XTO was cited for 81 violations for its drilling activity in the Marcellus. And on Dec. 10, 2010, the company was fined \$150,000 for "improper casing to protect fresh water."

Shale gas drilling isn't going away. It's too important to the economy, and there's too much money to be made. The environmental impact also can't be totally eliminated. Fracking a typical well requires millions of gallons of water, which

must then be disposed of safely. But many of the **problems can be addressed**. If drillers institute and follow high standards on cementing wells as they pass through aquifers and on proper handling of the water that flows back to the surface after fracking, spills and water contamination can be minimized. They can also lower the greenhouse gas impact of shale drilling by using "green completion" equipment that captures methane and volatile organic compounds from the drilling water and prevents them from escaping. This month the EPA is expected to finalize new regulations that make green completions mandatory on all new wells. The American Petroleum Institute, the industry's largest trade association, has argued that the industry needs more time to comply.

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Given Tillerson's long experience with fracking, it's perhaps not surprising that he takes criticism of shale drilling a bit personally. To him, the shale boom is a great example of the fundamental effectiveness of his industry — the kind of achievement that always seems to be unappreciated. "We go through this every time we go to a new area to develop," he says. "It's just part of how society deals with having their energy needs met. What I find interesting about the U.S. relative to other countries is in most every other country where we operate, people really like us. And they're really glad we're there. And governments really like us. And it's not just Exxon Mobil. They admire our industry because of what we can do. They almost are in awe of what we're able to do. And in this country, you can flip it around 180 degrees. I don't understand why that is, but it just is."

If Tillerson wants to fully realize the promise of shale gas in the U.S., he might need to figure out why.

Reporter Associate: *Doris Burke*

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