

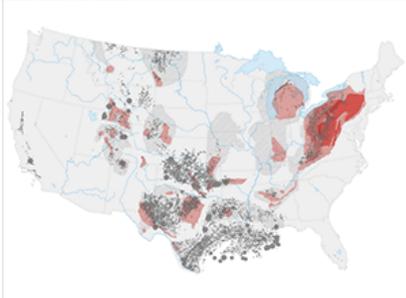
## Rediscovering Natural Gas By Hitting Rock Bottom

by TOM GJELTEN

September 22, 2009

text size **A A A**

### Interactive Map



Natural Gas: Traditional Drilling Areas And Shale Basins

*First in a three-part series.*

In recent years, natural gas producers in the United States have struggled, mostly in vain, to be taken more seriously in the energy world. Big oil companies like Exxon had concluded that natural gas reserves in the United States were not sufficiently abundant to warrant big investments in exploration and drilling. When small independent gas producers argued otherwise, they were often ridiculed.

"I once had to tell the Exxon people in front of a congressional committee that I respectfully disagreed with every single thing they had

presented," recalls Robert Hefner, 74, a veteran gas producer from Oklahoma.

But the natural gas folks now have numbers on their side due to new successes in getting gas out of shale rock. Geologists have always known that shale rock, often found in combination with coal and oil deposits, holds substantial amounts of natural gas. If a piece of shale rock is broken and lit with a match, it will actually burn for a few moments with a small flame.

The shale gas was previously considered unreachable, but advances in drilling techniques have changed that assessment. The result is a dramatic increase in estimated natural gas reserves. The Potential Gas Committee, loosely affiliated with the Colorado School of Mines, reported in June that natural gas reserves in the United States are actually 35 percent higher than believed just two years ago, and some geologists say even that estimate is too conservative.



Tom Gjelten/NPR

A deep drilling rig at the site of a shale rock formation in southwestern Pennsylvania. The rig, which was set up by Range Resources, a leading shale gas player, serves as a brace to support the drill.

### Drowning In Natural Gas

"I used to say the nation is awash in natural gas," Hefner says. "Now I say we're drowning in it."

One area getting new attention is the Marcellus basin, a 400-million-year-old shale formation stretching from New York to West Virginia. That basin alone is believed to hold as much as 500 trillion cubic feet of natural gas, the equivalent of about 80 billion barrels of oil. (There are also large shale gas basins in Texas, Wyoming, Arkansas and Michigan.) It is not clear how much of the shale gas is recoverable, but the new production techniques have boosted all previous estimates.

Shale formations are deep underground — 6,000 feet or more — and the rock is relatively impermeable. Deep drilling is expensive, and in the past the amount of gas that could be reached was not considered sufficient to justify the cost.

### Horizontal Drilling

In recent years, however, gas producers expanded the use of "horizontal" drilling. After boring more than a mile below the Earth's surface to reach the shale layer, a drill operator will slowly "steer" the drill bit to one side, until it is heading sideways across the shale layer, thus achieving access to more of the shale than a traditional vertical well could provide.

Even so, the tightness of the shale rock would mean that relatively little of the trapped gas would seep into the pipeline. Gas producers therefore fracture the rock by forcing a water and sand mixture into the formation at very high pressure. This "water fracturing" technique opens millions of tiny cracks in the rock, enabling more of the gas to seep out.

Horizontal drilling and water fracturing are not new techniques in the oil and gas business, but only in recent years have producers used the procedures in combination to produce shale gas, and the results have been dramatic.



Tom Gjelten/NPR

The drilling platform on a shale gas drilling rig. The shaft in the center is turning a drill bit deep underground. The drilling operation

continues 24/7.

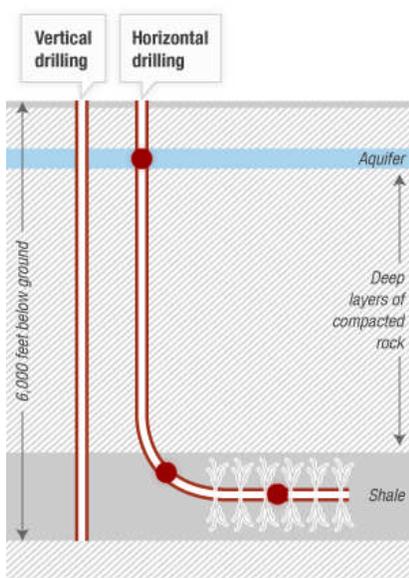
"It's the biggest thing I've ever even heard of," says Ray Walker, vice president of Range Resources, a gas exploration and production company.

"It's huge. The ability to produce these shale reservoirs is going to revolutionize this industry all over the world."

### Horizontal Drilling And Water Fracturing: The Keys To Shale Gas Production

Gas embedded in shale rock formations deep below the Earth's surface has long been considered inaccessible, due to high drilling costs. New horizontal drilling methods, combined with techniques to fracture the rock, have for the first time made shale gas production practical.

Roll over the red dots below for more information about the drilling methods.



Credit: Tom Gjelten, Alyson Hurt and Avie Schneider/NPR

Walker moved to Pennsylvania from Texas two years ago to direct his Fort Worth-based company's exploration of the Marcellus basin. Since then, Range Resources has dug more than 40 horizontal wells in Pennsylvania, and several dozen more are in preparation. In Texas, Wyoming and other areas, it's the same story.

### Spreading The Word

"[Shale gas] is the most important energy development since the discovery of oil," says Fred Julander, founder and chief executive of his own Denver-based gas company, Julander Energy.

But the word has not yet spread as far as gas advocates would like. Ian Cronshaw, the top gas analyst at the Paris-based International Energy Agency, highlighted the jump in estimated gas in his most recent energy outlook report, but noted that the news had gotten little notice. "If that had happened in the oil industry, it would be a headline item," Cronshaw said at a recent meeting in Washington. "But because it happened in gas, nobody seems to be paying any attention."

As an energy source, natural gas is cheaper than oil, and when burned it produces only about half the carbon dioxide that comes from burning coal. As long as natural gas reserves in the United States were believed to be nearing depletion, the fuel did not get much attention, but with the upward revision of estimated reserves, that has changed.

"Natural gas is the fuel that can change everything for our nation," says Robert Hefner, who lays out his case in a new book, *The Grand Energy Transition*. Hefner argues that a big boost in the use of natural gas would dramatically lower greenhouse gas emissions and reduce the U.S. dependence on foreign oil. Much of the nation's electrical power now generated by burning coal could instead come from natural gas, and a switch to natural gas-powered automobiles would produce dramatic results.

"If we were to convert half of our existing vehicle fleet [to natural gas], we would eliminate a little over half our oil imports," Hefner contends. He and other natural gas advocates have been supported in recent months by environmental organizations.

"There's a huge capacity of natural gas that is lying idle," says Timothy Wirth, a former Democratic senator from Colorado who now heads the United Nations Foundation. "That makes absolutely no sense at all when what we're trying to do is clean up the atmosphere."

### A 'Transition' Fuel

Natural gas is still a fossil fuel, and when burned it does produce greenhouse gases. Environmentalists working for the use of renewable energy sources nonetheless see natural gas as a transition fuel. One idea is to build mini-power generating stations, each connected to the natural gas pipeline infrastructure. A station attached to a hospital or a shopping mall could produce heat as well as electrical power, cutting energy costs dramatically.

"You can combine that with improvements in end-use efficiency and the development of renewable energy sources, and really see these as a partnership," says Christopher Flavin, president of Worldwatch Institute, an environmental research organization.

"Even the International Energy Agency is saying the path for oil is downward, and suddenly we've got this very different picture for natural gas," says Flavin. "I think it's unfortunately not fully percolated into the understanding of what's possible among policymakers. But I think as that takes hold in the next few years, it's really going to change the game."

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Recent First



**Stuart Knoles (Calen)** wrote:

Once I notice, it is rather audacious how those quoted in this report: Hefner, Walker, Julander, Wirth, and Flavin use, to put it nicely, superlatives and extremes like traveling salesmen.

Should this not raise some alert?

Tuesday, September 22, 2009 9:59:15 PM

[Recommend \(0\)](#)

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**Louanne Fatora (Louanne)** wrote:

Here is my open letter to the governor of West Virginia [http://wvhighlands.org/wv\\_voice/?p=1843](http://wvhighlands.org/wv_voice/?p=1843)

What a shock to have to listen to this story which appears staged by the natural gas industry. I have had to deal with the WV DEP for 4 weeks now, after having discovered a red/orange gel covering Buckeye Creek in Doddridge County West Virginia. A drilling company is doing the clean up, and I am questioning their qualifications - they can certainly produce this toxic mess, but cleaning it up is another story. Someone put it right when they said, "Give a drilling company an inch, and they will destroy a mile" Well this affected 3 miles over 4 weeks ago and all I am told is that "it's just going to take time".

Tuesday, September 22, 2009 9:59:11 PM

[Recommend \(0\)](#)

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**Megan Cosgrove (megrn)** wrote:

I was driving to work this morning and found myself startled by the angry shouting inside my car, only to realize that it was my own voice raised in an angry response to this disgusting pander to the natural gas industry. The points made in this 'report' would be laughable if not so dangerous to public understanding of the facts about "natural" gas. This is not an industry of small businesses, they are subsidiaries of multinational corporations. And fracking fluids are patented, secret, mixtures of hazardous chemicals, not WATER, as Tom Gjelton called it. This is not a benign backyard project that we have going on here, it is a dangerous practice with a long history of spills, contamination, and damage to communities. Please, don't insult your audience by trying to pass this story off as reporting, and don't ignore the comments left here. This story needs follow-up to correct the wrongs done to the facts.

Tuesday, September 22, 2009 9:56:18 PM

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**Jeffrey Peltz (Jeffbklyn)** wrote:

I listened to this story this morning waiting for the part of the problems with hydro-fracing. Much to my surprise, the dangers or in fact any problems were never mentioned. How can this be? The negative aspects of this drilling should have been at least half of the story. If I didn't already know the great problems with this type of drilling I would have thought that this was a wonderful way of getting clean gas.

I surely hope that a story is coming on the problems and dangers of injecting great quantities of water containing chemicals into the ground. However, even if this part of the story is yet to come, there should have at least been a mention of the problems. Every one will listen to the whole series.

Tuesday, September 22, 2009 9:47:13 PM

[Recommend \(0\)](#)

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**Buck Moorhead (the)** wrote:

Mr. Gjelton's report is simply stunning in, somehow, managing to fail to report the extraordinary health and environmental costs that the gas extraction industry has been exempted from by the 2005 Energy Act. Hydraulic fracturing, designed by Halliburton,

exempted from the Clean Water Act, Clean Air Act, Superfund Act, and Safe Drinking Act. One could "google" for ten minutes and find this out. Extremely disappointed in NPR; with seven minutes, failed to communicate the real essence of this: trading health and clean water for a short-term fossil fuel. NPR has done better, and can do better.

Tuesday, September 22, 2009 9:32:41 PM

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**Ann Worthington (LeesAnna)** wrote:

Tom, do some homework before doing any reporting.

"Three substantial chemical spills in less than one week at a natural gas drill site in Dimock Township in PA." Cabot Oil & Gas spilled "hundreds of gallons" of the same volatile chemical mixture THIS morning that can cause skin cancer and other health issues, that spewed out of a pipe, twice, last Wednesday - amounting to more than 8,000 gallons of the harmful fluid entering the environment. The first two spills impacted a wetland area and flowed into Stevens Creek, a tributary of the Susquehanna River." Excerpted from a local newspaper, The Wayne Independent.

Tuesday, September 22, 2009 9:17:45 PM

[Recommend \(3\)](#)

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**faith zerbe (everest)** wrote:

The tremendous amount of freshwater it will take to recover natural gas from marcellus shale is not sustainable (it takes 2-9 million gallons of water to frack a deep horizontal well). To give away our freshwater to a large industry and intentionally pollute it with fracking chemicals (~ 154 chemicals are added to the water), to allow massive fragmentation of forests to build well pads and lagoon pits to hold contaminated water - these forests protect the drinking water for over 15 million people who rely on it (in the case of the Upper Delaware which provides water to New York city and Philadelphia and all the surrounding residents well water); to know that virtually no human health studies have been conducted on the effects to humans and the environment from chemicals used in natural gas mining; and to see environmental devastation on the record from this same industry in Western PA and other states, how can we possibly give up our rivers, drinking water, and forests to a large and very well organized industry that wants to get blood from a stone? Visit [www.delawareriverkeeper.org](http://www.delawareriverkeeper.org) for more facts and NPR please balance your reporting on this issue that threatens long-term sustainability.

Tuesday, September 22, 2009 8:57:43 PM

[Recommend \(4\)](#)

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**Ann Worthington (LeesAnna)** wrote:

Outraged and horrified does not begin to express my opinion of this report I heard this morning as I made my way to a conference on "Cancer and the Environment." Nowhere is there any reference as to where the natural gas comes from and how one gets it out of the ground. Numerous spills, explosions and "accidents" involving toxic chemicals, pollution of drinking water wells, rivers, dead fish in streams, dead cattle lie in the wake of drilling for natural gas. Not to mention forcing people who want no part of drilling to have their land included (forced integration) along with eminent domain seizure of land for pipelines and gathering lines. Then there's the destruction of tiny country roads by massive drilling and water trucks for which the taxpayer has to pick up the tab and the drilling companies play politics so as to weasel out of paying for the true cost. Drilling companies also require lease holders to sign confidentiality agreements in exchange for a cash settlement when damage occurs so that the true amount of damage is hidden. I expect more responsible reporting from NPR

Tuesday, September 22, 2009 8:56:58 PM

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**Evan Romer (EvanRomer)** wrote:

I'm very disappointed in Tom Gjelten and NPR News. This report does not live up to their standards -- or to any journalistic standards. It's like writing a report about coal that just talked about this wonderful new technology of mountain-topping to get coal that was previously inaccessible. (Shale gas drilling is not as bad as mountain-topping, but it's pretty bad.) This report gives no hint that there might be problems -- the whole thing is EXACTLY what the gas drilling industry wants people to think. A reporter's job is to research and question, not just accept one point of view.

And it's not as though the risks and harms are hard to find out about. Start with ProPublica's excellent reporting, look at local papers such as the Binghamton Press & Sun-Bulletin and the Forth Worth newspaper, .....

Unbelievable.

Tuesday, September 22, 2009 8:49:27 PM

[Recommend \(4\)](#)

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**Thomas Wilinsky (dplatnyc)** wrote:

Even the introductory chapter of a series such as this is woefully incomplete without mention of the substantial environmental and public health risks associated with hydraulic fracturing. In Pennsylvania alone, where high volume fracking has been employed for less than three years, wells have been spoiled and streams turned into kill zones--one has only to google "Dimock" or "Cabot Gas Drilling Contamination" to see how immediate and extreme the risks are.

Tuesday, September 22, 2009 8:40:36 PM

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