



# Natural gas supply, jobs and technique debate booming

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Bob Myers, an avid hiker, in Lock Haven, Pa., has become concerned that state forests are being freely leased to drilling firms, leading to clear-cutting of forests, sludge pits and risks of accidents.

Robert Myers spends a lot of time hiking and fishing in state forests, "places where my grandfather went hunting," he says.

But the hiking grounds for this [Lock Haven](#), Pa., English professor and local activist are changing with what some critics say is the threat to the

environment that comes as part of the latest boom: the hunt for natural gas. And Myers hates what it's doing to the Eastern forests. "It sickens me what the gas wells are doing to the places I love."

Energy companies increasingly are drilling into the Marcellus Shale, a mile-or-so-deep layer of methane-rich black rock stretching from [Tennessee](#) to [New York](#). The layers of shale are being tapped for natural-gas deposits, which in turn has led to a boost in U.S. natural-gas supplies, lower energy prices for consumers and jobs in areas hit hard by unemployment.

But the supply boom has arrived with new concerns about the potential environmental damage from techniques used to retrieve the gas.

The debate highlights the choices the USA faces as it pursues a greener economy: If burning natural gas in place of some coal can cut carbon dioxide emissions, what environmental risks are we willing to tolerate?

In March, the Environmental Protection Agency announced that a science panel would examine the safety of hydraulic fracturing, a decades-old but much-improved drilling technology behind the boom.

Hydraulic fracturing cracks shale with water mixed with chemicals and fills the cracks with sandy grit, allowing gas trapped in the shale to bubble out. But among the environmental concerns raised by the process: chemical leaks, wear and tear on forests and roads and even minor [earthquakes](#).

Once the sands of an inland sea, about 20 such deposits lie in North America, filled with methane produced by the decay from the bugs, plants and animals that ended up in the ancient ooze. The [U.S.](#)

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Geological Survey estimates that 200 trillion cubic feet of natural gas may be recoverable from these shales in a country that consumes about 23 trillion cubic feet a year.

But that may be a conservative estimate: The actual amount of natural gas in the "Big Seven" deposits, which includes Marcellus and shales in Texas, Arkansas and elsewhere, may be even bigger. In 2008, Penn State geoscientist Terry Englander estimated that the Marcellus alone might have more than 516 trillion cubic feet.

"It's a boom," says environmental engineer JeanneVan-Briesen of Carnegie Mellon University in Pittsburgh. "That means a lot of choices, a lot of consequences good and bad."

Pittsburgh, for example, is where the Monongahela and Allegheny rivers meet to start the Ohio River. And two years ago, the Monongahela River's salt levels reached excessive amounts, probably in part because of the "flowback" water from new hydraulic fracturing wells draining into the river, adding to acid-laced leaks from coal mines, VanBriesen and colleagues find.

Power plant operators along the river, who need the water for cooling, were first to detect the problem when they spotted corrosion on scrubbing equipment. Fish have died in rivers near Myers' hiking trails, which he blames on the wells.

**A risk of runoffs**

"Energy and water mix hand in hand," says environmental biophysicist Susan Riha of Cornell University in Ithaca, N.Y. With hydraulic fracturing, she says, potential risks range from the chance of chemicals such as benzene leaking into local drinking water to landscape damage to questions about who benefits from a new energy boom.

"I started out worried about what was happening in state forests," Myers says. "But now I see much wider effects, in streams and public safety."

Alongside private landowners, Myers' state leases well sites on public lands to energy companies near Lock Haven. Digging a well at such sites requires clearing a 5-acre patch of forest and digging a sludge pit for the flowback water, which is often laced with salt and proprietary chemicals from the fracturing process. By 2008, more than 450 wells

had been dug in Pennsylvania in three years, according to the Pennsylvania Department of Conservation and Natural Resources.

In 2005, the Bush administration exempted gas wells from storm water discharge permits, a decision the EPA may revisit when the science review is completed. "Any time you have an open pit, you have the risk of runoffs," Riha says.

Most prominently, the non-profit news organization ProPublica reported in a 2008 investigation more than 1,000 cases in which hydraulic-fracturing-related wells have been tied to leaks or accidents, including fires.

Adding to debate over hydraulic fracturing, Riha says, the risks and benefits of the boom aren't doled out evenly: Landowners who lease to well drillers see financial gains, while their neighbors worry about their drinking water wells suffering methane and chemical contamination. They also have to drive on crumbling roads crowded with oversized fracturing-water trucks.

And some of the risks might be more exotic. In March, a Leading Edge journal study led by seismologist Brian Stump of Southern Methodist University in Dallas suggested hydraulic fracturing had triggered small earthquakes in Texas in 2008 and 2009, when flowback water was "deep-injected" onto an earthquake fault, one method of getting rid of wastewater that doesn't let it flow into streams.

"The history of the region is people exploiting the

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resources, ruining the wilderness, and then leaving the mess behind," says Myers, an English professor at Lock Haven (Pa.) University.

But that's a tough argument in a region eager for jobs. "I've attended county meetings to discuss gas wells where the crowd has been pretty hostile," Myers says. "The last thing they want is a tree-hugging English professor saying they might endanger their neighbors with their lease."

Indeed, the head of the Clinton County Economic Partnership where Lock Haven is based says the drilling has brought jobs and "new wealth" to an area with 9.5% unemployment.

"It's like someone dropped a new bag of money" on the region, says Michael Flanagan, president and CEO of the Clinton County group. "That said, we also understand the environmental concerns" but believe they're "controllable."

### The bigger picture

Assuming the safety of drinking water remains the central question, "there's no reason to think EPA's current study will render results that differ a whole lot from the various other studies that have been done on the subject," says Chris Tucker of Energy in Depth, a natural-gas industry group based in Washington. He notes a 2004 EPA report that found the technology "safe and well-regulated."

Climate change makes the hydraulic fracturing debate a bigger one than just another row pitting energy companies against environmentalists. "The story in all this is how we deal with thinking through the water and climate impacts of our energy choices," VanBriesen says.

On the climate side, natural gas produces only about half of the carbon-dioxide emissions of coal burned to produce electricity, according to the Energy Information Administration. In January, a Congressional Research Service report suggested that doubling the nation's electric power generation from gas, with a corresponding drop in coal, would reduce current coal-plant carbon dioxide emissions by 19%, lowering total U.S greenhouse gas emissions by about 6% overall.

"We could, today, simply through the increased use of existing natural-gas fired power plants, meaningfully reduce the CO<sub>2</sub> emissions of the power

sector," natural gas plant chief Jack Fusco of the Calpine Corp. told senators in October. Former senator Timothy Wirth, D-Colo., head of the United Nations Foundation, has called natural gas a "bridge fuel" for switching from fossil fuels to renewable, climate-friendly-ones in this century.

"Any changes in how we get energy are going to be disruptive," Riha says. Even wind turbines, prime examples of renewable energy, have faced opposition from landowners in New York state and Pennsylvania who are worried about their mountain views.

"People think it is some sort of minor change switching to a green economy, but no energy system is a seamless solution without environmental impacts," Riha says. "People need to start coming to grips with the future."

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