

Shedding light on shale gas

The struggle over how, and whether, to drill for shale gas may be the nation's most controversial environmental issue. In this interview, Mark Brownstein, EDF's chief counsel for energy, speaks candidly about the promise and peril of the natural gas boom.

Want to start an argument? Just tell someone you oppose shale gas drilling. Or that you support it. Either way, you'll probably get an earful. Mark Brownstein knows this from experience. As the man who directs EDF's natural gas work, he's on the firing line.

Today, shale gas is part of a modern day Gold Rush. In 1990, shale gas contributed 1% of America's natural gas; in 2009, 16%; today some 30%. By 2035, that number is projected to hit 49%.

This *could* be a good thing. Domestic shale gas could increase America's energy security and has already created hundreds of thousands of jobs. It could also accelerate the development of a cleaner, less carbon-intensive economy, because gas burns much cleaner than coal or oil and doesn't emit mercury or the other dangerous pollutants produced by coal.

But shale gas extraction can also cause serious problems, including dangerous levels of air pollution, contamination of ground and surface water, and despoiled farms and forests. Moreover, even though natural gas emits only half the greenhouse gas of coal when burned, it could end up accelerating global warming. Why? Because it consists mostly of methane, a greenhouse gas many times more potent than carbon dioxide. And it's hard to keep natural gas from leaking into the atmosphere.

That's why EDF is fighting for tough rules that protect the environment and human health from unsafe natural gas development.

In the following interview, Brownstein discusses the challenges EDF faces in achieving that goal.



Mark Brownstein

John Rhee

Why work on the issue at all?

Because EDF believes it's possible to protect every American's right to clean air and water, while developing a resource that could produce major economic and environmental benefits for the nation.

But for that to happen, the natural gas industry needs to step up to its responsibilities. So far, though, the industry has largely chosen to ignore or deny its problems. To say that it has a credibility problem is an understatement.

Still the responsibility for safely developing shale gas doesn't lie solely with the people doing the drilling. We believe that everyone with a stake in this growing controversy—communities in drilling areas, energy companies, environmentalists, and political leaders—must work together to find a way forward.

When did you realize that shale gas was going to be a big deal?

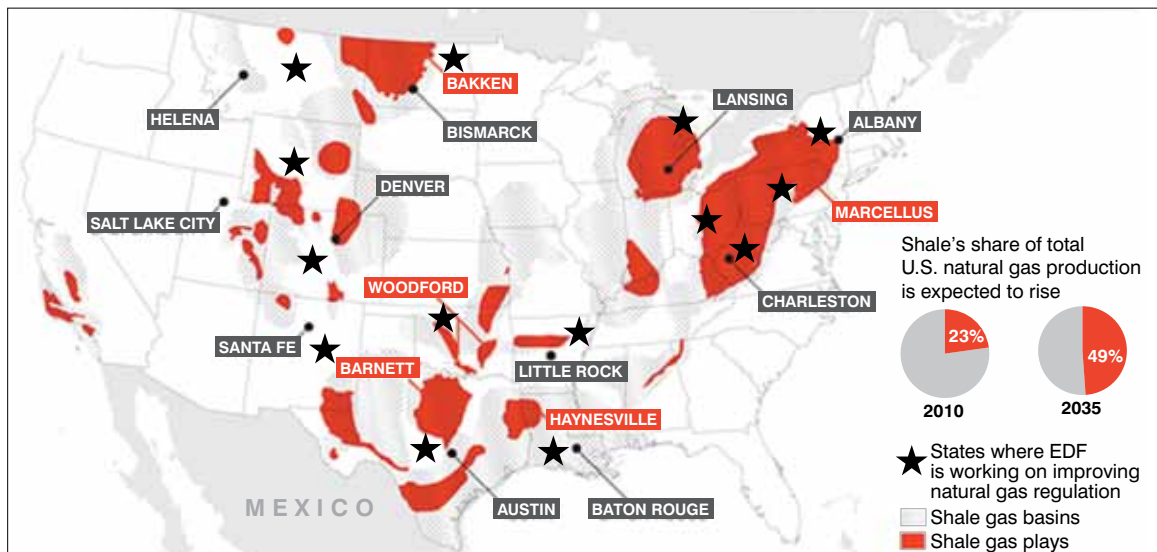
Several years ago, at a conference in Houston, I learned that the gas industry had succeeded in commercializing the technologies needed to extract shale gas. Instantly, a light went on in my head.

It was clear this would be huge, because the United States had been slowly running out of natural gas. The only option was to import it, which would be expensive and, as with oil, leave the country's energy needs in the hands of foreign nations. But now, suddenly, we had access to more domestic natural gas than we could imagine.

For environmentalists, too, this development changed all our calculations.

When I came to EDF in 2006, the utilities industry was proposing to build more than 100 new coal-fired power plants. We were trying to stop them. Today, those proposals have disappeared. In fact, we're now talking about how many existing coal plants we can close. This

THE UNITED STATES OF SHALE GAS





Ruhrfisch

Natural gas drilling rig in Moreland Township, PA, which sits above the Marcellus Shale formation.

was unthinkable six years ago and it's largely due to the new supplies of cheap natural gas driving coal out of the system.

Why has shale gas become so controversial?

Well, frankly, the industry failed to be honest with communities about the risks of shale gas development, and what it was or wasn't doing to minimize them.

Hydraulic fracturing, or fracking, the process used to extract the gas, uses large amounts of pressurized water, sand and chemicals. And there have been way too many examples of poor production practices that ruined land and caused local air pollution, water contamination or disruption of local communities.

There are ways to prevent these things, but the industry, by failing to deal openly and honestly with its mistakes, bred public skepticism and mistrust. It's going to be hard for natural gas companies to overcome those missteps and win back the public trust.

Some organizations have called for a moratorium or a ban on fracking and shale gas drilling. EDF has not. Are environmentalists divided on this issue?

Not on the central issue, which is the need to protect public health and the environment. We all believe that no community should have to sacrifice its public health or the quality of its environment.

Our disagreements are about tactics. Some groups want a nationwide moratorium or a ban on shale gas development. Others, including EDF, support a ban on drilling in sensitive areas or places where gas reserves lie too close to aquifers. But overall, we believe the most effective course of action is strong industry regulation, which will greatly reduce the existing risks.

Why not skip natural gas and develop renewable energy instead?

There's no question we can do more, right now, with renewables like wind and solar. But keep in mind that natural gas and coal provide about 65% of our nation's total electricity, with another 20% coming from nuclear power. Unfortunately, in the short term, renewables and energy efficiency cannot replace all the electricity generated by these sources.

EDF is devoting a lot of time and effort to making the next generation electrical grid, the so-called smart grid, a reality. A modernized grid will enable much greater use of renewable

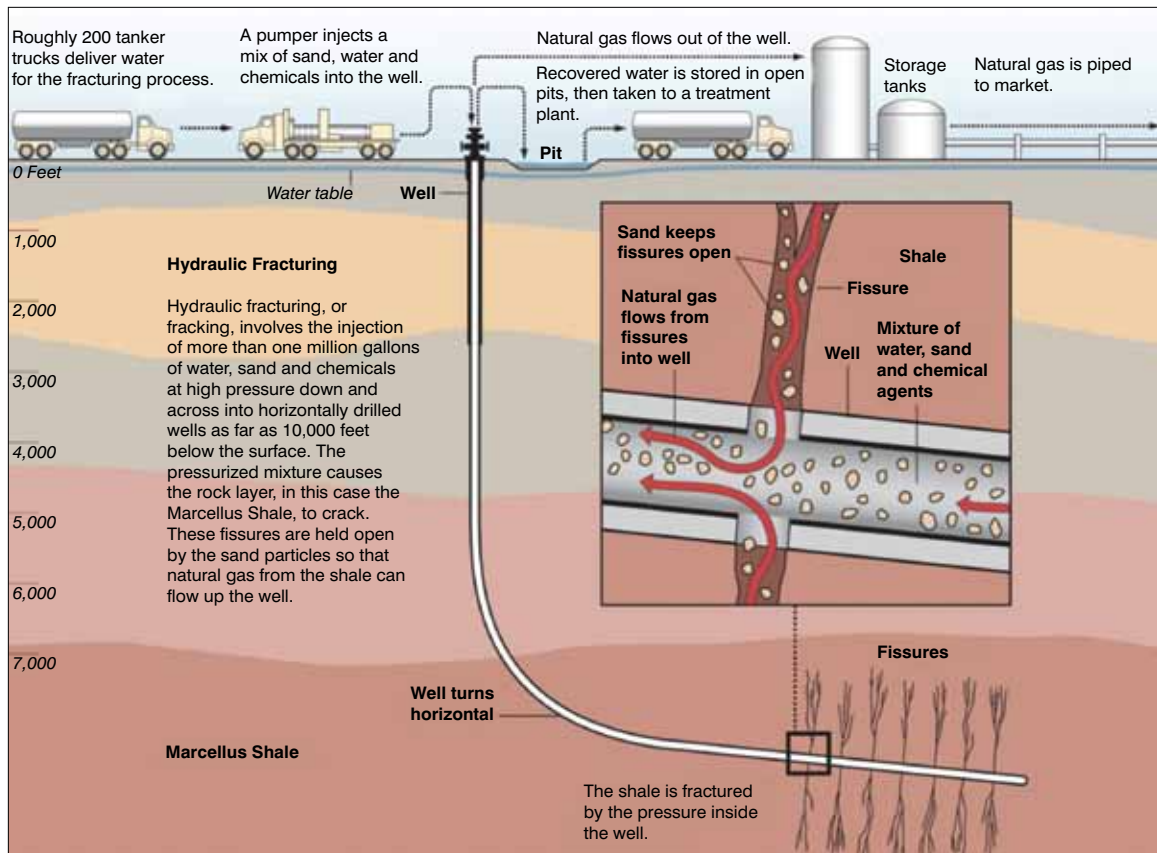
Renewable energy is the next big thing. But at this point, we still need the power natural gas delivers.

energy and energy efficiency and demand response technologies. And we're working on innovative financing strategies to enable businesses and individuals to become more energy efficient and install renewable energy systems on a scale never seen before.

All of this takes time, however, so natural gas will likely be with us for a while. And keep in mind that two-thirds of natural gas use in the United States has nothing to do with producing electricity. It is our primary fuel for cooking and home heating, and it plays a major role in the manufacture of fertilizers, pharmaceuticals and plastics.

So even if we could go to 100% renewable energy tomorrow, there would still be a huge demand for natural gas.

FRACKING: WHAT'S REALLY GOING ON DOWN THERE



How can we clean up the natural gas industry?

It begins and ends with regulation, which in most cases is either outdated or inadequate. Take Pennsylvania, where there have been some much-publicized cases of water contamination.

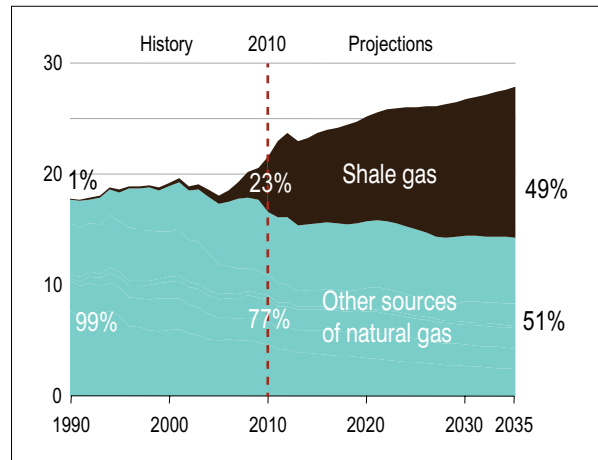
The state, it turned out, lacked strong well construction regulations and communities were experiencing groundwater pollution.

Those rules, if written right, control how you drill a well and how you make sure that the chemicals you put down it (and the gas and water that come up) are kept isolated from drinking water sources.

The rules specify things like the quality of the cement that must be used to isolate a gas well from the surrounding geology, the depth to which that cement must be injected, and the frequency of follow-up tests to assure the integrity of the cement.

I know this sounds pretty wonky, but the details of these rules and regulations are critical to protecting the public health.

U.S. NATURAL GAS PRODUCTION (TRILLION CUBIC FEET)



Source: U.S. Energy Information Administration

On the rise: Shale gas production is surging.

What is EDF doing to get better regulations on the books?

We're focused on 14 states that represent 85 percent of the country's unconventional gas reserves. These are the states at the heart of the shale gas boom, where it is critical we get the rules right.

Natural gas companies claim their methods are safe, yet they can't tell you precisely what pollutants are coming out of their wells.

In almost every state with significant natural gas production, there are stories about individuals and communities being harmed by poor industry practices. As states recognize the problems, they look to see what others have done to address them.

Colorado and Wyoming, for example, have some of the best air regulations in the country. We are pushing states to follow their lead, even as we are pushing Colorado and Wyoming to make their rules even stronger.

The bottom line is that gas production is occurring today. That means we need to be working with communities, industry, regulators and elected officials to get better regulations on the books right now.

Should people expect more from the gas industry?

Absolutely. It's interesting, whenever I talk to industry groups, I say: "You assert that your processes are safe, but what are the air emissions from your well sites? And what is the chemical composition of the wastewater you're producing?"

They never answer because they don't know. And my next question is: "Well, if you don't have that information, how can you assure me that your processes are safe? You can't manage what you don't measure."

So, clearly, industry has to do a much better job of monitoring and measuring its emissions and effluents, and then use that information to reduce all that can be reduced. And it has to make that information publicly available, so people can know what is happening in their communities and hold companies accountable.

Is natural gas better than coal for global warming?

The industry says it is. But here again, there is a need for reliable data. The data on methane emissions from natural gas production is not great. That's why EDF has joined with several research universities, including University of Texas, Duke and Harvard, and a number of energy companies, to collect solid data on methane leakage—from wellhead to end user.

It's going to take two years or so to complete this project, but we'll wind up with a much better picture of how much methane is leaking, from where, and how to reduce it.

No one should have to sacrifice clean air or clean water for energy production. The gas guys can take a hike if they don't understand that.

Already, we know that leakage rates are high enough that immediate action is needed to reduce them. New federal air quality regulations imposed on the oil and gas industry are a good beginning, and states like Colorado and Wyoming have begun to step up, but much more needs to be done.

Reducing methane pollution is a key issue for EDF because methane is a greenhouse gas many more times powerful than carbon dioxide. If enough of it is getting out, that could erase the advantage natural gas has over coal in the fight against climate change.

This is all the more important if, as the President has proposed, the government encourages the use of natural gas for motor vehicles. We're pretty certain that, unless we learn how to do a better job of reducing leaks, using it to power cars and trucks would make things worse in terms of global warming. I don't think anyone wants that, including the folks selling natural gas vehicles.

A lot of what EDF is trying to accomplish depends on industry cooperation. But what incentives do companies have to work with us?

Well, this industry right now is experiencing what I call a slow motion Three Mile Island effect.

The accident at Three Mile Island was a disaster for the domestic nuclear power industry and left a lasting impression on a generation of Americans. With the natural gas industry, there hasn't been one big disaster; instead, there have been a lot of small incidents. Documentaries like *Gasland* and reporting by ProPublica, *The New York Times*, NPR and many other news organizations have made "fracking" an ugly household word.

The result is that the Three Mile Island effect is now beginning to show itself in towns that pass bans on gas development within their borders and in state legislatures that balk at letting shale gas development go forward.

Natural gas executives have been slow to get it, but some are starting to move in the right direction. So are governors, legislators and state regulators who are getting a loud and clear message from communities: protect public health and the environment or tell the gas guys to take a hike.

EDF agrees. No one should have to sacrifice clean water or clean air for the sake of domestic energy production. And people have every right to protest if companies are careless and regulators look the other way.

What's your answer to people who believe that no environmental organization should ever work with gas companies?

EDF has always understood that, to solve the toughest environmental problems, you have to talk to everyone—those causing the problem, those suffering from it, and those with the power to do something about it.

The thing is, and I can't overemphasize this, *we can't wish this problem away*. Ninety percent of all onshore oil and gas production in the United States today involves hydraulic fracturing. And natural gas plays a huge role in our society, so stopping gas development just isn't realistic.

That *doesn't* mean we support drilling everywhere.

There are clearly sensitive areas that need to be exempt, like the New York City watershed, which supplies unfiltered water to millions of people. And in some places, the shale deposits may be too shallow and the surrounding geology inadequate to safely separate the drilling zone from, say, an aquifer that supplies drinking water.

METHANE LEAKAGE FROM NATURAL GAS OPERATIONS



59% Natural gas production



20% Transmission and storage



13% Local distribution



8% Processing

Natural gas, which is mostly methane, finds many ways to escape into the atmosphere, as these estimates show.

Source: EPA. Photos, bottom to top: DCP Midstream; W.L. Sunshine; TransCanada; Chesapeake

What is EDF's goal for natural gas?

Today, in many places, the risks that come with shale gas drilling are intolerable. We are going to change that.

If shale gas drilling comes to your town, your expectation should be that it will cause no permanent or long-term damage. That means no public health problems from air pollution; no water pollution that degrades the quality of your drinking water. And no acceleration of global warming due to methane emissions.

We're pushing for those things—in the states and in Washington—and we need our members to push for those things as well.

We need people to speak up and say: "I want companies to publicly disclose their air emissions and the chemicals in their wastewater so I can know what is happening in my community. And I want my legislature to create a surtax on gas production with the specific purpose of hiring trained inspectors. And I want strong regulations and vigilant enforcement so I can feel confident that the gas companies will do things right."

If enough people do this, the politicians will listen and then companies will listen and things will change.

ADDITIONAL READING

For those interested in learning more about shale gas development, the following material is available online.

The U.S. Department of Energy offers this thorough shale gas primer:
www.netl.doe.gov/technologies/oil-gas/publications/epreports/shale_gas_primer_2009.pdf

Pro Publica, the nonprofit investigative news organization, is publishing an ongoing series of reports on fracking and shale gas: www.propublica.org/article/fracking-cracks-the-public-consciousness-in-2011

Time magazine looks at the prospects and pitfalls of natural gas:
www.time.com/time/magazine/article/0,9171,2062456,00.html

The International Energy Agency published a report, *The Gold Rules for a Golden Age of Gas*, that provides an authoritative overview of the global natural gas boom: www.worldenergyoutlook.org/goldenrules/#d.en.27023

Businessweek recently interviewed Fred Krupp, EDF's president, about his work on shale gas:
www.businessweek.com/articles/2012-06-14/fred-krupp

The Environmental Defense Fund Catalyst Circle is a committed group of generous donors whose investment forms the core of our financial base and makes our achievements possible.

For more information, please contact Ruth Cole at 800 505 0703 ext. 1248 or email catalystcircle@edf.org.

Environmental Defense Fund T 212 505 2100 New York, NY / Austin, TX / Bentonville, AR / Boston, MA / Boulder, CO / Raleigh, NC /
257 Park Avenue South F 212 505 2375 Sacramento, CA / San Francisco, CA / Washington, DC / Beijing, China / La Paz, Mexico
New York, NY 10010 **edf.org** Printed on recycled paper (30% post-consumer)