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## Could Shale Gas Reignite the U.S. Economy?

Unlocking vast reserves of shale gas could solve the energy crisis, the jobs crisis, and the deficit. Now, about fracking's safety ...

By [Paul M. Barrett](#)

In late 1998, Chesapeake Energy ([CHK](#)), an independent natural gas producer based in Oklahoma City, exemplified an industry in decline. The company's stock price had fallen over two years from above \$34 a share to 75¢. Its market value tumbled 93 percent, to \$72 million. "They're running up a down escalator," Michael Spohn, an analyst at Petroleum Research Group, told Bloomberg News.

When Aubrey K. McClendon, Chesapeake's chief executive officer and co-founder, announced he might sell the company, there was little interest. Falling gas prices had reduced the value of Chesapeake's reserves from \$2.1 billion to \$661 million. "We'd had higher highs than others in the industry; then we had lower lows," McClendon says with characteristic insouciance. "In this business, it's good to have a short memory and thick skin."

Good thing he didn't sell. Thirteen years later, Chesapeake's market value exceeds \$18 billion. Its shares sell for about \$28, up 8 percent this year. The company's 120-acre neo-Georgian corporate campus bustles with construction crews building new office space. Its workforce has grown 30 percent in a year, to 12,200, and its recruiters have 700 jobs to fill. "The United States," McClendon boasts, "has the capacity to become the Saudi Arabia of natural gas."

A tall man who wears his wavy silver hair long by CEO standards, McClendon, 52, exudes the confidence of someone who's

certain he's seen the future. Exploitation of newly accessible supplies of gas embedded in layers of what's known as shale rock, he predicts, will help revive domestic manufacturing and change the terms of debate about global warming. "It's a new industrial renaissance," he says.

You'd expect that kind of exuberance from a man with everything to gain from seeing his vision made real, but it's not just independent drillers such as Chesapeake that are talking big. ConocoPhillips ([COP](#)) is investing \$2 billion in gas in 2011, up from \$500 million two years ago. Other multinational oil giants, such as ExxonMobil ([XOM](#)) and Shell, are likewise diverting billions into domestic shale gas projects. "We believe so strongly in natural gas that it's a major portion of our portfolio," Conoco CEO James J. Mulva told an audience at the Detroit Economic Club in September. Last month, the potential for U.S. shale gas spurred Kinder Morgan ([KMI](#)) to acquire rival pipeline operator El Paso Corp. ([EP](#)) for \$21.1 billion. It also drove the proposed \$4.4 billion purchase of Brigham Exploration ([BEXP](#)) by Norway's Statoil ([STO](#)).

Encouraged by the availability of inexpensive and cleaner domestic gas, some electric utilities are replacing their coal-burning capacity with gas-fired units. Energy-intensive manufacturers of chemicals, plastics, and steel are beginning to bring home operations that they exported years ago. "We believe natural gas must be part of any discussion on strengthening our country's long-term economic health," Mulva said in Detroit. "It should also be part of any discussion on improving energy security, protecting the environment, and, yes, creating jobs."

On the economic potential of the nascent shale revolution, even some career environmentalists sound impressed, if cautious. "This thing is a potential game-changer," says Fred Krupp, president of the New York-based Environmental Defense Fund (EDF). Shale production in the U.S. has increased from practically nothing in 2000 to more than 13 billion cubic feet per day, or about 30 percent of the country's natural gas supply. That proportion is heading toward 50 percent in coming years. The U.S. passed Russia in 2009 to become the world's largest producer of natural gas. An Energy Dept. advisory panel on which Krupp sits estimated in August that more than 200,000 jobs, both direct and indirect, "have been created over the last several years by the development of domestic production of shale gas." At a moment of 9.1 percent unemployment nationally, additional decently paid work is just one potential benefit. "Natural gas burns cleaner than coal, emits less in the way of greenhouse gases, and avoids mercury and other pollutants from coal," Krupp points out. "So this could be win-win, if—and this is a big 'if'—we do it the right way."

**Geologists have known for generations** that immense, deeply buried shale formations contain copious reserves of methane, or natural gas, which can be burned efficiently to make electricity and run factories. Until recently, however, industry lacked the tools to get at shale gas profitably. In the early 2000s, the combination of two existing techniques led to a breakthrough. One method is horizontal drilling. The other is hydraulic fracturing, or “fracking,” a scary-sounding and controversial process involving the high-pressure pumping of millions of gallons of chemical-laced water deep underground to create cracks in shale rock and release trapped gas.

When in 2007 environmentalists began raising reasonable concerns about fracking, industry executives responded with a dismissive, “Just trust us”—ensuring that skeptics would trust them less. Just in case concern didn’t turn into panic on its own, the industry for years took the additional step of refusing to disclose the chemicals it uses in fracking. Lost amid the suspicion and recrimination was a potentially more constructive discussion over improving industry standards for drillers’ concrete-lined steel casing, which, when installed correctly, has successfully insulated wells from drinking water.

Now, though, there’s some surprising good news: Despite all the vituperation on both sides, some people from business and environmental circles are quietly at work in Texas, New York, and Washington on guidelines that should ensure a safe, profitable gas revival. The Environmental Defense Fund, for example, is drafting model state regulations with Southwestern Energy ([SWN](#)), a producer based in Houston. The collaboration is rooted in the recognition that the choice between polluting fossil fuels and pristine alternatives is not simple. For the foreseeable future, the U.S. has to burn a whole lot of something to produce power. The nation now gets 45 percent of its electricity from coal, 25 percent from natural gas, 20 percent from nuclear, 7 percent from hydro, and 2 percent from wind. Solar barely registers. With current technology, wind and solar probably can’t reach into double digits, let alone bear the bulk of the load.

If you want to continue to turn on the lights with the flip of a switch, the real short-term choice is whether to stick with the current mix or replace a substantial amount of coal capacity with less dirty natural gas. John Podesta, former chief of staff to ex-President Bill Clinton, argues for the latter option. Now head of the Center for American Progress in Washington, Podesta writes on the liberal think tank’s website that natural gas can serve “as a bridge fuel to a 21st century energy economy that relies on efficiency, renewable sources, and low-carbon fossil fuels.” Exploring where that bridge will lead should be one of the

country's most important economic priorities.

**Like petroleum, natural gas is a hydrocarbon**, a product of decomposed organic material that simmered underground for hundreds of millions of years. Simple in structure—one carbon atom and four hydrogen atoms—gas has a convoluted history in the U.S. In the 1970s, federal price restrictions contributed to underproduction and shortages, leading to wintertime shutdowns of Midwestern schools and factories. Utility executives and consumers came to view natural gas as unreliable.

A titanic political fight during the Carter Administration ended in a bizarre compromise: price deregulation combined with restrictions on burning gas to generate electricity. (The coal industry, it should be noted, sponsors a long-established and adroit K Street lobby.) By the 1990s, the limits on using natural gas for power had been eased, and new turbine technology made gas an attractive alternative to coal. Furious construction of gas-fired power plants ensued, only to be followed by dismay: Gas supplies were not expanding apace. At the turn of the 21st century, some natural gas basins were nearly tapped out, and once again many utilities, homeowners, and energy-intensive manufacturers dismissed domestic gas as a sucker's bet.

It might have stayed that way if not for the stubbornness of a Texan named George P. Mitchell. The son of an immigrant Greek goat herder, Mitchell worked his way through Texas A&M University in the late 1930s waiting tables and repairing clothes for students. After World War II, he went into the oil and gas business in Houston, working from a tiny office above a drugstore. All through the '80s, Mitchell pondered geological studies showing that gas could be found not only in conventional reservoirs but also in deeper, denser “unconventional” shale formations.

Shale is where gas is actually created. Energy men call it “the kitchen,” where hydrocarbons “cook,” and where large amounts of gas remains trapped. Mitchell wondered: Why not drill all the way down to the kitchen? His exploration company probed the Barnett Shale, a slab sprawling 7,000 feet beneath Dallas and Fort Worth. Competitors scoffed. “We we running low on gas, and I had to find another reservoir somewhere,” Mitchell, now 92, told Bloomberg News. “So I said let's drill a well and see what this thing is about.”

He invested his faith and capital in hydraulic fracturing, which had been introduced in rudimentary form in the late '40s.

Injected at enormous pressures and in huge volumes, fracking fluid creates narrow cracks in the shale. Sand diffused in the fluid stays behind and props open the cracks, allowing gas to flow out and up through the well. “Mitchell Energy,” the industry consultant Daniel Yergin writes in his new book, *The Quest: Energy, Security, and the Remaking of the Modern World*, “cracked the code.”

In 2002, after 60 years in the business, George Mitchell decided to cash out. Devon Energy ([DVN](#)), a better-capitalized independent in Oklahoma City, acquired his company for \$3.5 billion. Devon brought to the Barnett a knack for horizontal drilling. Improvements in equipment controls and measurement methods allowed its crews to drill down and then turn the gnawing diamond-tipped bit sideways. Drillers penetrate the shale laterally rather than just vertically. This exposes more of the surface area of the formation to extraction and enables multiple wells to be created from each drill pad.

Devon could not keep the field to itself. Rivals rushed in to lease tracts in Texas, Arkansas, Louisiana, and Oklahoma. Following geologists’ amazingly precise three-dimensional subterranean maps, the drillers went as far east as the Marcellus Shale, a formation that extends below Western New York State, over into Pennsylvania, and all the way down to West Virginia and Tennessee. Few people outside the industry noticed, but a shale stampede was under way.

**After almost selling his company** during the late-’90s doldrums, Aubrey McClendon dramatically switched strategy and wagered Chesapeake’s future on shale. (A few years later, he lost much of his personal fortune during the financial crisis of 2008 before gaining it back.) Today, Chesapeake is the most active driller of new wells in the U.S., with 177 rigs in operation. It is the country’s second-biggest overall producer of natural gas, behind only ExxonMobil, which announced in late 2009 that it would join the gas rush by buying XTO Energy for \$41 billion. Anadarko Petroleum ([APC](#)) is the third-largest producer, followed by Devon.

McClendon is descended from a prominent Oklahoma oil family, the Kerrs of Kerr-McGee fame. Prospecting is in his DNA. In 2003 he instituted what he called his “land rush plan”: Chesapeake borrowed heavily and bought leases in the Barnett, some of them in built-up parts of the Dallas-Fort Worth metro area. At midnight after the jets stopped arriving at Dallas/Fort Worth International Airport, workers drilled next to the quiet runways. In 2005, McClendon’s geologists discovered gas in a rich shale

play in Northwest Louisiana and East Texas called the Haynesville. (Shale projects are commonly referred to as “plays.”) Also in 2005, Chesapeake paid \$2.2 billion for the second-largest gas producer in Appalachia, becoming the biggest presence in the Marcellus play. McClendon, who got his start in the business as a “land man,” or oil and gas lease broker, built a one-of-a-kind database of millions of property records from obscure county courthouses. The digitized trove has allowed Chesapeake to beat rivals to the doorsteps of landowners whose farms or backyards sat atop buried shale gas.

A runup in gas prices—to nearly \$14 per thousand cubic feet in mid-2008—made McClendon look like a genius. A few months later, he seemed less smart when the economy imploded, dragging down the price of energy and of Chesapeake’s stock (which fell from a high above \$69 a share in July of that year to \$11 in December). McClendon personally had borrowed against his large individual holdings to buy yet more company stock. When the bottom fell out, he was hit with margin calls that forced him to liquidate a big chunk of his investments.

Like most entrepreneurs in the up-and-down energy business, McClendon takes occasional setbacks in stride. It helps to have a loyal board of directors. In 2009, the Chesapeake board gave the CEO a \$100 million pay package. The company also paid him \$12 million for a collection of 19th century maps he owned.

Why the well-timed company largesse? McClendon, citing pending shareholder litigation over his pay, answers guardedly. He was properly rewarded for his work during 2008, he says, and received an appropriate “retention package” to ensure his remaining as CEO. As for the maps, he says he had paid out of his own pocket for years to decorate the halls and conference rooms of the company, and it was time for Chesapeake to make him whole. The company denies any impropriety. On Nov. 1, the litigation was settled, and McClendon agreed to rescind the map sale and repay Chesapeake the \$12 million, plus interest. Today he has assets valued at more than \$1 billion, including a 19.2 percent stake in Oklahoma City’s National Basketball Assn. franchise, the Thunder.

Burning natural gas for power, McClendon proudly points out, results in about half the equivalent carbon dioxide emissions of coal. Such observations, however, have not kept him from becoming a target of activists who are trying to shut down fracking—and have succeeded in some places, such as New York State. Environmentalists, McClendon believes, should feel much more warmly toward him. He readily acknowledges that human activity contributes to global warming. “Why take a chance,” he says, “when we can reduce our carbon emissions through consuming more natural gas and less coal and oil?” It’s

in his pecuniary interest to hold that opinion, of course.

**Many residents of Louisiana, Oklahoma, and Texas**—places accustomed to oil and gas development—welcomed the “shale gale” and its accompanying jobs, packed cafés, land royalties, and rising local tax revenue. The reaction was far more mixed in New York and Pennsylvania, despite the latter’s history of oil and coal exploration. In the Northeast, some residents objected to heavy truck traffic and rural vistas marred by towering steel rigs and murky wastewater pools. Even more intense were concerns about the effects of shale drilling on drinking water supplies. Some homeowners complained that after gas operations began, well water started tasting bad and children fell ill.

Activists raised questions about whether the chemicals in fracking fluid were contaminating drinking water with benzene, methanol, and other dangerous substances. In 2008, *BusinessWeek* published an article by the nonprofit journalism organization ProPublica that identified episodes of water contamination near (although not all definitively caused by) gas activity in seven states: Alabama, Colorado, Montana, New Mexico, Ohio, Texas, and Wyoming. In 2010, New York stopped issuing permits for fracking to give environmental authorities there time to study the situation.

Hit with pollution lawsuits, Chesapeake and other producers denied that fracking caused water contamination. For one thing, the companies said, the procedure typically takes place a mile or more below drinking water aquifers and is isolated by massive layers of impermeable rock. According to the industry, drillers had done more than a million frack jobs going back to 1948 without proof of widespread pollution problems. Drillers also pointed to a study of fracking released in 2004 by the U.S. Environmental Protection Agency that supports their position.

O.K., environmentalists said, so what chemicals are you mixing into fracking fluid? That’s secret, the industry answered.

“That was a very, very stupid answer,” says Jim Gipson, a spokesman for Chesapeake. “In this country, if you tell people you’re keeping secrets from them, they will naturally assume you are doing something wrong.”

The producers blame the furtiveness on big drilling contractors, companies such as Halliburton ([HAL](#)), that actually devise and inject the frack fluid recipes. The contractors insisted that their recipes were safe, but deserved confidentiality as proprietary

trade secrets. The industry's conduct fueled protests in New York and Pennsylvania, which adopted as their manifesto *Gasland*, a documentary that made its official debut in January 2010 at the Sundance Film Festival, went on to air on HBO, and was nominated for an Academy Award. The film memorably showed homeowners near drilling operations lighting their tap water on fire and complaining about contaminated waterways.

While *Gasland* raised relevant questions, it overstated the dangers related to drilling shale gas. It suggested rampant water contamination caused by gas operations. In contrast, a study by researchers at the Massachusetts Institute of Technology released earlier this year found about 20 reported cases of groundwater contamination between 2005 and 2009. Some of these problems were traced to flawed cement used in well construction, though not to the fracking process itself. Pennsylvania and other states have since toughened drilling construction standards.

Flammable tap water is a real phenomenon in some areas, albeit a rare one. It's caused by methane seeping into household wells, and it can happen regardless of whether gas drilling is going on nearby. The challenge in tracing the source of methane seepage is that the gas can occur naturally and contaminate water without any industrial activity. (Not that anyone would want an incendiary kitchen faucet, but methane gas in water isn't toxic, and it evaporates quickly.)

This August, Josh Fox, *Gasland's* director, accompanied a woman named Natalie Brant when she testified before a hearing on fracking held by members of the New York State Senate. Brant, whose family lives south of Buffalo, testified that before the state's moratorium on fracking went into effect, several of her eight children developed headaches and nosebleeds, which she attributed to nearby gas drilling. "We're constantly worried about our children and if they're going to come down with cancer or other illnesses because of what they've been exposed to," she said. State environmental officials have said that methane occurs naturally in well water in Brant's part of the state, and that the gas turned up in other water wells in the area before drilling began.

Chesapeake's McClendon (whose company wasn't specifically implicated by Brant) says claims such as Brant's, compelling though they may seem, aren't based on hard evidence pointing to hydraulic fracturing. But in a speech in September at a conference in Philadelphia, he acknowledged a series of "limited gas migration incidents in Pennsylvania in the past three years." One of those led state regulators to impose a \$900,000 fine on Chesapeake for polluting drinking water in Bradford County. "These incidents were not related to fracking," McClendon said. Instead, they were caused by faulty well casing. "Only



a couple dozen homeowners claim to have been affected,” he said. “And more importantly, the industry worked closely with Pennsylvania’s Environmental Protection Dept. officials to implement an updated and customized casing system that has been effective in preventing new cases of gas migration. Problem identified. Problem solved.”

**McClendon has a tendency to exacerbate** hostilities by belittling his antagonists. At the Philadelphia conference he described protesters’ “vision of the future” in these derisive terms: “We’re cold, it’s dark, and we’re hungry.”

Such condescension notwithstanding, Chesapeake and other natural gas producers have made concessions. Overcoming some of the concerns of their contractors, Chesapeake and other producers (and the contractors themselves) have begun to disclose the chemical additives used in fracking. An industry-sponsored website, [www.fracfocus.org](http://www.fracfocus.org), allows companies voluntarily to report the additives on a well-by-well basis. “We just decided to do what we should have done from the start,” says Chesapeake’s Gipson. Disclosure isn’t universal yet, but it’s headed in that direction. Arkansas, Texas, and certain other gas-producing states have enacted legal requirements for full disclosure as a condition of continued fracking.

At [fracfocus.org](http://fracfocus.org), visitors will find that some of the stuff in fracking fluid is definitely not what you’d want in your water glass. Ingredients may include hydrochloric acid (initiates cracks), methanol (inhibits corrosion), glutaraldehyde (kills bacteria), and ethylene glycol (winterizes product). Frack fluid is typically 98 percent to 99.5 percent water and sand, with the additives making up the remainder, according to the industry. When the nasty stuff passes by any drinking water supply, it is supposed to be contained securely within at least two layers of steel casing and two layers of heavy-duty cement. No one disputes that there can be problems if there are flaws in the steel or concrete. The industry says such accidents have been exceedingly rare.

The 2011 MIT study estimates that between 2005 and 2009 there were some 50 incidents nationwide involving a variety of gas drilling mishaps: groundwater contamination, surface spills, offsite disposal issues, air quality problems, and well blowouts. To provide guidance on how to reduce gas drilling risks, the DOE set up its seven-person shale committee. The EDF’s Krupp sits on the panel, which is chaired by John M. Deutch, a Director of Central Intelligence during the first Clinton Administration. Other members include the consultant and historian Yergin and several scholars and former regulators.

Despite Krupp's participation, some environmentalists have written off the DOE committee as an industry-influenced rubber stamp. These critics note that Deutch, a professor at MIT, holds a directorship on the board of Cheniere Energy ([LNG](#)), a Houston-based liquefied natural gas company, and formerly served on the board of Schlumberger ([SLB](#)), a major drilling contractor. Even Krupp "has his own connections to the industry," Dusty Horwitt, senior counsel at the Environmental Working Group, a nonprofit in Washington, said in a radio interview in May.

The sniping reflects distrust of the pragmatism Krupp embraces. A 57-year-old lawyer by training and the son of a New Jersey businessman who recycled rags and cardboard, Krupp heads a nonprofit that promotes the use of market forces to protect the environment. He regularly takes flak from harder-line activists who oppose his willingness to work with industry. His "industry connection" to shale gas consists of having hired as a senior policy adviser a former employee of the Texas Independent Producers and Royalty Owners Assn.

After conferring with the Sierra Club, the Natural Resources Defense Council, and other nonprofits, Krupp had considerable influence on the 41-page preliminary report the DOE committee released in August. The paper calls for mandatory state-enforced disclosure of fracking ingredients, stricter standards on conventional air pollution created by shale operations, and additional research on underground methane migration and greenhouse gas releases associated with gas drilling. The panel persuasively explains the need for government inspection of casing and cementing and for more careful disposal of wastewater that comes up from wells.

The report doesn't address the sticky question of whether the EPA should be given more authority over gas drilling. At present, state agencies regulate the industry. Gas executives grimace when asked about the EPA being given responsibility for permitting their operations. "There's no evidence the states aren't doing the job adequately," says Henry J. Hood, Chesapeake's senior vice-president and general counsel. "The EPA doesn't have the manpower or the state-by-state expertise."

Some environmentalists angrily stress that in 2005 Congress made explicit that another federal law, the Safe Drinking Water Act, doesn't cover fracking. The exemption certainly reflects the strength of the oil and gas lobby, but with a U.S. House of Representatives controlled by anti-regulatory Republicans, the chances of getting the provision reversed at this point are exactly zero. Debating it is more of a distraction than anything else and obscures that the EPA has authority to take action

against gas drillers and producers that violate the Clean Air and Water Acts. Rather than drawing another bull's-eye on the EPA's back, a savvy approach would be to use the DOE report as a blueprint for broadly framed principles that state officials enforce vigorously.

Smart industry executives should accept tough standards as the cost of resolving environmental anxiety. In January 2010, one such corporate leader, Southwestern Energy's executive vice-president and general counsel, Mark K. Boling, picked up the telephone and called Scott Anderson, the Texas-based EDF gas expert whose industry experience makes him suspect in the eyes of some fellow environmentalists. Southwestern traces its roots to an Arkansas gas concern incorporated in 1929. Boling, a former partner with the Houston law firm Fulbright & Jaworski, has spent his entire legal career promoting the interests of oil and gas clients. Now, he says in an interview, those interests include demonstrating that fracking is safe. "It's not enough to say we've been fracking for 60 years and no one has proved there's a problem," Boling adds. "We've got to get out there and educate, encourage better regulation, and pick up our performance in every aspect."

Boling's phone call to Anderson produced a cautious series of negotiations leading to a 37-page draft state regulatory code for gas operations. "Our idea is not that this should be adopted word for word by any state," Anderson explains. "This is not one size fits all. Instead, it's an attempt to show what a responsible producer and a responsible environmental organization consider best practices. It's something to work toward."

A dozen other gas producers have been shown the draft, and many offered comments, which have been incorporated, says Anderson. "What we're working on are mostly very technical underground issues that have technical solutions," he says. "Fracturing should be safe, if it is done properly. We have a ways to go, but this is a good model for working out our differences."

**The incentives for working out those** differences are compelling. In New York, where local opposition to fracking remains strong in some communities, Governor Andrew M. Cuomo inherited a permitting moratorium on the procedure imposed by his predecessor, David A. Paterson. Since taking office in January, Cuomo has encouraged the drafting of a more stringent state regulatory scheme. Released for public comment in September, the proposal would allow fracking subject to rules suited to

New York's geology and regional politics. It would prohibit drilling within 2,000 feet of public drinking water supplies or 500 feet of the state's 18 primary aquifers. Drilling within the watersheds that provide unfiltered water to New York City and Syracuse would be banned altogether.

Even with these and many other restrictions, the Cuomo plan would make more than 80 percent of the Marcellus Shale within New York viable for drilling, says Joe Martens, the state's commissioner of environmental conservation. "Our most conservative estimate is that we could add more than 13,000 jobs, direct and indirect," Martens says. "The higher estimate is nearly 54,000 jobs."

That kind of boost could bring struggling towns in Western Upstate New York back to life. "Right across the border in Pennsylvania," Martens says, "we can see the jobs and tax revenue that can come with shale gas." Assuming that New York regulators receive the resources to enforce the proposed toughened rules and effectively protect water supplies, he says, "New Yorkers deserve to get the same [economic] benefits."

The potential for creating jobs goes beyond the bereft former farm towns of rural New York. Every day, Dow Chemical ([DOW](#)) alone uses the equivalent of 700 million cubic feet of gas and ethane (a natural gas derivative). That's as much as all of Australia consumes on a daily basis. More plentiful domestic gas supplies now priced at around \$4 per thousand cubic feet have allowed Dow to announce multibillion-dollar expansions of facilities in Louisiana and Texas, according to Executive Vice-President James R. Fitterling. "We expect to employ up to 1,300 workers per project to construct our two new propane dehydrogenation units and a new ethylene cracker," he told an energy conference in Houston on Sept. 26. "We also expect between 400 and 500 new, long-term Dow jobs to operate and maintain the facilities." That's just one chemical company.

Some electric utilities are overcoming their deep-seated uneasiness over natural gas to shift parts of their operations from coal to gas. The switch is inviting because many coal-burning facilities are antiquated, and the country already has large amounts of more modern, underused natural gas utility capacity (a holdover from overbuilding in the late 1990s). The coal industry is fighting fierce rear-guard battles to prevent the move to gas. But a variety of federal antipollution rules taking effect in coming years will provide an additional reason to consider gas. Power companies in 15 states, including California, Florida, and Pennsylvania, have recently announced expanded use of natural gas, often at the expense of coal, according to America's Natural Gas Alliance, a trade group.

“We need to find a way to take advantage of this historic opportunity to cut back on burning coal, which is the worst energy option,” says the EDF’s Krupp. And he says that as an advocate of more wind- and solar-generated electricity. The best way to exploit renewable power on a large scale is to use it in conjunction with natural gas plants. Gas-fired generation ensures steady power when the wind isn’t blowing or the sun isn’t shining. “Done the right way,” Krupp says, “there’s just a lot to be said for natural gas.” — *With reporting by Cristina Alesci and Ken Wells*

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