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US shale gas bonanza: New wells to draw on

By Ed Crooks

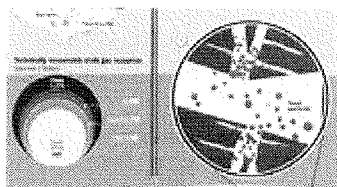
Now the technology exists to extract the reserves, the promise is of an industrial renaissance



In eastern Ohio, brand-new tractors have been zooming off the dealers' lots, snapped up by local farmers. Suddenly cash-rich after being showered with bonuses for leasing oil and gas drilling rights on their land, typically worth \$1,500-\$4,000 an acre, they have been quick to invest their windfalls in new equipment.

A few years ago, those same leases would have sold for just \$15 per acre. The difference now is that eastern Ohio is at the heart of the region that has become the most exciting area for oil and gas development in North America: the Utica shale.

Within the past two years, the industry has woken up to the prospect that the rock layer stretching across the north-east of the continent from Kentucky to Ontario is rich



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in oil, gas and the “natural gas liquids” such as ethane and propane that are used as feedstock for the chemicals industry. Leading companies – including Chesapeake Energy, ExxonMobil and Hess – have between them spent billions of dollars building land holdings with drilling rights.

Estimates of the Utica shale’s reserves are imprecise but Aubrey McClendon, Chesapeake chief executive, has said he thinks the region could hold 25bn barrels of oil and gas: almost as much as the entire proved reserves remaining in the North Sea. Chesapeake is already reporting “very strong initial drilling results” from its first Utica wells in eastern Ohio and western Pennsylvania.

The implications for long-depressed rust belt US states are momentous. The east Ohio tractor boom is one small harbinger of what many people believe is an impending economic revolution.

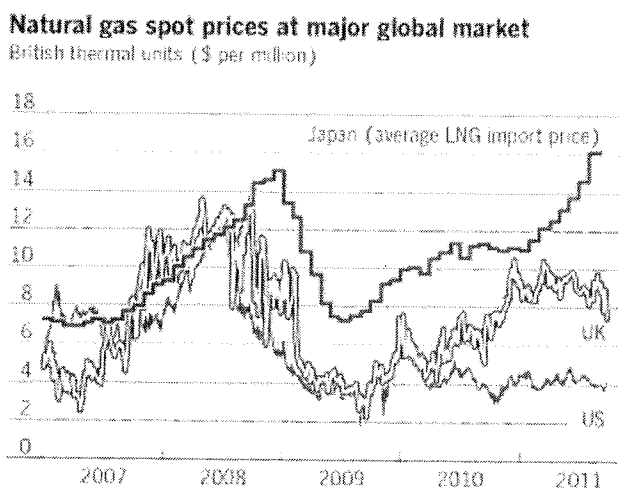
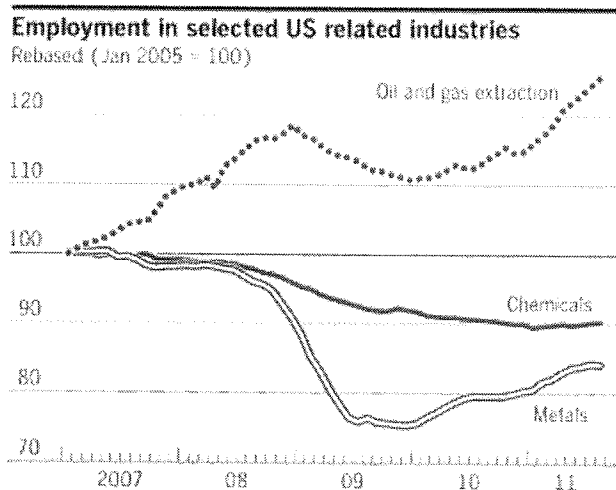
For decades, as factory employment declined inexorably and US pre-eminence in manufacturing was eroded, its industry has been looking for a lifeline. Now it may have found one, in the shape of shale gas and oil: resources that were long thought impossible to access commercially but have been unlocked by techniques perfected during the past decade.

Many other countries, including China, are also thought to hold large shale gas reserves. Britain was gripped last month by reports of a huge discovery in Lancashire in north-west England. The US, however, is way out in front in terms of knowing how to extract the gas. That knowledge creates a crucial competitive advantage that American companies are determined to exploit, not just in gas and oil extraction but in chemicals, steel and other sectors.

By creating fast-growing markets for production equipment and services, and providing cheap energy and raw materials, the shale producers are holding out the promise of an American industrial renaissance. “It’s a phenomenal opportunity,” says Andrew Liveris, the chief executive of Dow Chemical, who is a vocal supporter of US manufacturing. “This is a gift that American entrepreneurs, the wildcatters, the oil and gas drillers, have given the country: 100 years of natural gas supply. There’s no country on the planet that wouldn’t love to get that, and then use it.”

As with most fairy tales, however, the gift comes with a curse. Plans for using this lavish hydrocarbon endowment are threatened by public disquiet over hydraulic

fracturing – “fracking” – the process used to release gas and oil by pumping water and chemicals underground at high pressure. President Barack Obama is broadly supportive of shale; the Republicans generally even more so. Yet if the industry causes any serious pollution, a public backlash could keep those resources trapped underground.



Sources: EIA; BLS; Thomson Reuters Datastream

At a gloomy time for the US economy, the oil and gas sector is a light that burns brightly. As well as direct employment in exploration and production, which is up by 17,000 over the past year to 177,000, the industry is creating thousands of jobs in its suppliers. In Youngstown in eastern Ohio, for instance, France's Vallourec is building a \$650m plant to make steel tubes for oil and gas wells. For an area that has not fully recovered from the decline of the steel industry in the 1970s, the plant is a blessing unimaginable a few years ago.

“When we watch the national news about the state of the US economy being negative, we're not seeing that here. We're seeing the optimism,” says Walt Good of the Youngstown/Warren business chamber. “People thought they'd never see an industrial investment of this scale again, and now they see this 1m sq ft plant going up. It really gives heart to the psychology of everyone in the area.”

The Pennsylvania-based US Steel is another company investing in Ohio to make tubes for oil and gas wells, committing \$100m to a new facility to revitalise a plant that first started production in 1905. As well as benefiting from supplying shale gas producers, it is making growing use of their product as a raw material.

John Surma, US Steel chief executive, explained recently how the company has been substituting cheap gas for expensive coal in its blast furnaces, saving tens of millions of dollars a year, and is exploring techniques to yield even bigger savings. “We are thankful”, he said in a speech to industry executives last month, for “the natural gas

your revolutionary work is helping to bring to market”.

Shale gas is particularly important because it is stranded in US, with no facilities to sell it on world markets, although the country's first liquefaction plant to enable the gas to be exported is now under development. As a result, gas is much cheaper in North America than in other leading economies. The US price of about \$3.60 per million British thermal units compares with about \$8 in the UK and \$16 in Japan.

The cost comparison is even more favourable for US manufacturers of petrochemicals that use gas as a raw material and compete with international rivals using oil-based feedstocks. The US gas price works out at the equivalent of \$22 a barrel, about one-fifth of the Brent crude price of more than \$100.

“Natural gas is to the chemicals industry as flour is to a bakery,” says Cal Dooley, president of the American Chemistry Council, an industry group. “Cheap gas means both international and American companies are now looking at the US as the preferred location for new investment.”

**Public opposition:
Fracking fluid, gas leaks
and ‘flammable water’**

Hydraulic fracturing or “fracking” is not a new technique – it was first used in the US in 1947 – but it has been enhanced in the past decade to open up “tight” rock such as shale, from which gas and oil would not flow freely without assistance.

Public opposition is focused on the composition of fracking fluid: the mix of water, sand and chemicals pumped into oil and gas reservoirs thousands of feet deep. There is evidence of gas leaking into water reservoirs, leading to the alarming phenomenon of “flammable water”, which can be ignited when the tap is turned on.

Of more serious concern would be contamination of water supplies during injection. There is not yet a confirmed case of

The big prize in this competition is ethylene, an essential intermediate product used to make many plastics. Dow said this week that while Middle Eastern ethylene producers had the lowest costs of all, the US was now lower-cost than south-east Asia and well below western Europe or north-east Asia. Those calculations have inspired the company to restart one ethylene plant in Louisiana next year and to build a new one in the US to start operating in 2017.

Other companies are reaching similar conclusions. Royal Dutch Shell has said it plans to build an ethylene plant in the Appalachia region, meaning Pennsylvania, Ohio or West Virginia. Other oil and gas groups, including Chevron and ConocoPhillips, are also looking at possible new plants. LyondellBasell, the chemicals company, and Williams, which operates gas pipelines, are looking at adding to their US production capacity.

For the first decade of the millennium, high and volatile gas prices made US production uncompetitive relative to producers in emerging economies. Jeffrey Lipton, a former chief executive of Canada's Nova Chemicals who now

this, but opponents say much more research is needed to determine whether it is a risk. There are many instances of fluids being improperly disposed after use.

Environmental groups argue that it is particularly worrying that the ingredients of some fluids are not publicly disclosed. The American Petroleum Institute, the industry group, has published a list of typical components, including salt, food additives, and chemicals used in anti-freeze and cosmetics. Some companies are now disclosing ingredients, or using only chemicals approved for human consumption. But others are reluctant to reveal what they call commercially sensitive intellectual property. Many experts and companies in the sector, however, including Royal Dutch Shell, argue improved disclosure is the only way to restore public trust.

spreads the shale gas gospel, says the balance of power has shifted back to North America. Unlike in some industrial sectors, China has no competitive advantage in chemicals, because it is an importer of gas and oil.

As the effect of cheaper American raw materials works through the value chain, Mr Dooley says, other manufacturers will also be encouraged back to the US to take advantage. “Even in the auto industry we are starting to see a response,” he says. “There are composite and plastic components presently being made outside the US, because it has been cheaper. That competitive advantage no longer exists. In the future the US will be in a far stronger position to be a supplier to the auto industry.” The ACC estimated in March that a 25 per cent increase in ethane production could create 400,000 jobs.

There will be limits to how far the gas-powered industrial comeback can go, however. The importance of raw material and energy costs varies widely between industries, and in some they are only marginally significant. US industry is still struggling with problems of weak demand and a currency that is overvalued relative to China’s renminbi. The ACC’s 400,000 jobs to be created compares with 2m manufacturing jobs – and 6.5m jobs in

total – that have been lost in the US over the past four years.

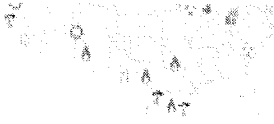
Like other resource booms, the shale revolution offers the US a chance to rebuild vital parts of its industrial base. The fear shared by many of the people who hope to profit from it is that the country will not seize that opportunity.

As shale gas production has grown during the past decade, and development has migrated north and east from the Barnett Shale in Texas where it began, concerns about possible pollution from fracking have grown. In August, Friends of the Earth and 68 other environmental groups wrote to Mr Obama urging him to “employ any legal means to put a halt to hydraulic fracturing . . . a highly controversial and dangerous method of ‘natural’ gas exploration”.

Interactive graphic: The future of US energy



Peter Voser, Shell chief executive, told the Financial Times recently that he thought the gas industry had been “not clever” in its communications strategy and had “let it go



An audit of the energy system of the US, and assessments of the leading companies and the most powerful policy makers that will shape that future

for too long” without responding properly to its critics. An independent advisory panel to the US government warned in August that unless the industry raised its standards, “public opposition will grow, thus putting continued production at risk”.

In Pennsylvania, about 100 municipalities have adopted bans or restrictions on fracking, even though the state has approved it.

For companies hoping to benefit from shale production, the conclusion is clear: oil and gas producers have to make sure they avoid an incident that could impede the shale industry in the way last year’s Deepwater Horizon disaster hit offshore drilling.

“If I was the CEO of one of those companies, I’d have to be absolutely sure that everything we were doing in terms of drilling and other operations was as environmentally effective as possible,” Mr Lipton says. “It’s incumbent on the oil and gas industry to be purer than most people expect it to be, and to make a real investment not just in communications but in the real practical work that they do.”

If the industry does not make sure that its environmental performance is watertight, the possibilities for job creation could vanish on the breeze.

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