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Natural gas

An unconventional glut

Newly economic, widely distributed sources are shifting the balance of power in the world's gas markets

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SOME time in 2014 natural gas will be condensed into liquid and loaded onto a tanker docked in Kitimat, on Canada's Pacific coast, about 650km (400 miles) north-west of Vancouver. The ship will probably take its cargo to Asia. This proposed liquefied natural gas (LNG) plant, to be built by Apache Corporation, an American energy company, will not be North America's first. Gas has been shipped from Alaska to Japan since 1969. But if it makes it past the planning stages, Kitimat LNG will be one of the continent's most significant energy developments in decades.

Five years ago Kitimat was intended to be a point of import, not export, one of many terminals that would dot the coast of North America. There was good economic sense behind the rush. Local production of natural gas was waning, prices were surging and an energy-hungry America was worried about the lights going out.

Now North America has an unforeseen surfeit of natural gas. The United States' purchases of LNG have dwindled. It has enough gas under its soil to inspire dreams of self-sufficiency. Other parts of the world may also be sitting on lots of gas. Those in the vanguard of this global gas revolution say it will transform the battle against carbon, threaten coal's domination of electricity generation and, by dramatically reducing the power of exporters of oil and conventional gas, turn the geopolitics of energy on its head.

Deep in the heart of Texas

The source of America's transformation lies in the Barnett Shale, an underground geological structure near Fort Worth, Texas. It was there that a small firm of wildcat drillers, Mitchell Energy, pioneered the application of two oilfield techniques, hydraulic fracturing ("fracing", pronounced "fracking") and horizontal drilling, to release natural gas trapped in hardy shale-rock formations. Fracing involves blasting a cocktail of chemicals and other materials into the rock to shatter it into thousands of pieces, creating cracks that allow the gas to seep to the well for extraction. A "proppant", such as sand, stops the gas from escaping. Horizontal drilling allows the drill bit to penetrate the earth vertically before moving sideways for hundreds or thousands of metres.

These techniques have unlocked vast tracts of gas-bearing shale in America (see map). Geologists had always known of it, and Mitchell had been working on exploiting it since the early 1990s. But only as prices surged in recent years did such drilling become commercially viable. Since then, economies of scale and improvements in techniques have halved the production costs of shale gas, making it cheaper even than some conventional sources.

The Barnett Shale alone accounts for 7% of American gas supplies. Shale and other reservoirs once considered unexploitable (coal-bed methane and "tight gas") now meet half the country's demand. New shale prospects are sprinkled across North America, from Texas to British Columbia. One authority says supplies will last 100 years; many think that is conservative. In 2008 Russia was the world's biggest gas producer (see chart 1); last year,

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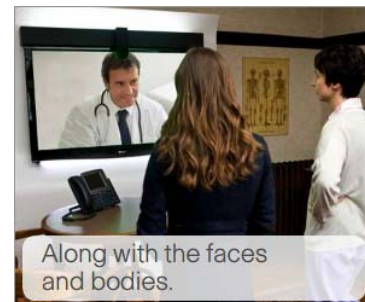
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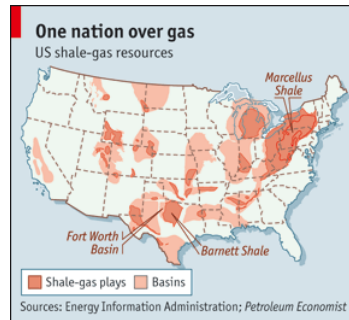
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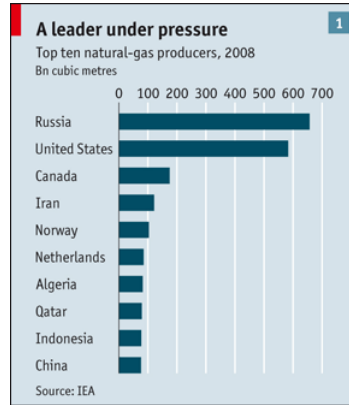


Along with the faces and bodies.

with output of more than 600 billion cubic metres, America probably overhauled it. North American gas prices have slumped from more than \$13 per million British thermal units in mid-2008 to less than \$5. The “unconventional”—tricky and expensive, in the language of the oil industry—has become conventional.

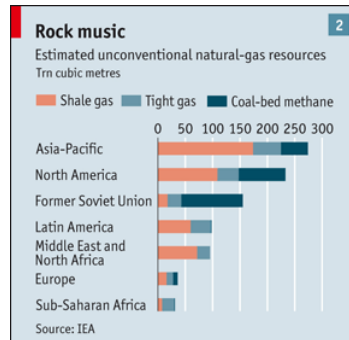


The availability of abundant reserves in North America contrasts with the narrowing of Western firms’ oil opportunities elsewhere in recent years. Politics was largely to blame, as surging commodity prices emboldened resource-rich countries such as Russia and Venezuela to restrict foreign access to their hydrocarbons. “Everyone would like to find more oil,” says Richard Herbert, an executive at Talisman Energy, a Canadian firm using a conventional North Sea oil business to finance heavy investment in North American shale. “The problem is, where do you go? It’s either in deep water or in countries that aren’t accessible.” This is forcing big oil companies to get gassier.



The oil majors watched from the sidelines as more entrepreneurial drillers proved shale’s viability. Now they want to join in. In December Exxon Mobil paid \$41 billion for XTO, a “pure-play” gas firm with a large shale business. BP, Statoil, Total and others are sniffing around the North American gas patch, signing joint ventures with producers such as Chesapeake Energy. A wave of consolidation is likely in the coming months, as gas prices remain low, the drillers seek capital and the majors hunt for the choicest acreage.

Shale is almost ubiquitous, so in theory North America’s success can be repeated elsewhere. How plentiful unconventional resources might be in other regions, however, is far from established. The International Energy Agency (IEA) estimates the global total to be 921 trillion cubic metres (see chart 2), **more than five times proven conventional reserves.** Some think there is far more. No one will really know until companies explore and drill.



The drillers are already arriving in Europe and China, which are both expected to import increasing amounts of gas—and are therefore keen to produce their own. China has set its companies a target of producing 30 billion cubic metres a year from shale, equivalent to almost half the country’s demand in 2008. Several foreign firms, including Shell, are already scouring Chinese shales. After a meeting between the American and Chinese presidents last November, the White House announced a “US-China shale gas initiative”: American knowledge in exchange for investment opportunities. The IEA says China and India could have “large” reserves, far greater than the conventional resource.

Exploration is also under way in Austria, Germany, Hungary, Poland and other European countries. The oil industry’s minnows led this scramble, but now the big firms are arriving too. Austria’s OMV is working on a promising basin near Vienna. Exxon Mobil is drilling in Germany. Talisman recently signed a deal to explore for shale in Poland. ConocoPhillips is already there. The first results from wells being drilled in Poland, in what some analysts believe is a shale formation similar to Barnett, should be released this year.

No one expects production of shale gas in Europe to make a material difference to the continent’s supply for at least a decade. But the explorers in China and Europe present a long-term worry for those who have bet on exporting to these markets. Gazprom, Russia’s gas giant, is the company most exposed to this threat, because its strategy relies on developing large—and costly—gasfields in inhospitable places. But Australia, Qatar and other exporters also face a shift in the basics of their business.

Choked

These producers are already getting a taste of the global gas glut. Almost in tandem with the surge in American production, recession brought a slump in world demand. The IEA says consumption in 2009 fell by 3%. In Europe, the drop was 7%. Consumption in the European Union will grow marginally if at all this year and will not be sufficient to clear an overhang of supplies, contracted through take-or-pay agreements signed in the dash for gas of the past

decade. IHS Global Insight, a consultancy, reckons that the excess could amount to 110 billion cubic metres this year, almost a quarter of the EU's demand in 2008.

The glut has been exacerbated by the suddenly greater availability of LNG. Importers with the infrastructure to receive and regasify LNG can now easily tap the global market for spot cargoes. This is partly a product of the recession, which dampened demand from Japan and South Korea, the leading LNG buyers. But another cause is that many exporters, not least Qatar, the world's LNG powerhouse, spent the past decade ramping up supplies aimed at the American market. That now looks like a blunder.

America is still taking some of this LNG, but the exporters' bonanza is over before it ever really began. "You'll always find a buyer in North America," says Frank Harris, an analyst at Wood Mackenzie, a consultancy, "but you might not like the price." And LNG will grow increasingly abundant as new projects due to come on stream this year add another 80m tonnes to annual supply, almost 50% more than in 2008.

Qatar's low production costs mean it can still make money, even in North America. Others cannot. In February, for example, Gazprom postponed its Shtokman gasfield project by three years because of the change in the market. Some of the gas from that field, in the Barents Sea, was to be exported to America. But Shtokman's gas will be costly, because the field is complex and its location makes it one of the world's most difficult energy projects to execute. Some analysts now wonder whether gas will ever flow from Shtokman.

China offers some hope for ambitious exporters, but even there the outlook has become cloudier. The Chinese authorities want natural gas to account for at least 10% of the country's energy mix by 2020 and are building LNG import terminals. With that target in mind, Australia, which has its own burgeoning conventional and unconventional gas supplies, has been busily building an LNG export business. But warning lights are coming on. In January, PetroChina let a deal to buy gas from Australia's Browse LNG project expire. The original agreement was made in 2007, when LNG prices were soaring in Asia, but China can afford to be picky now. "Too many Australian LNG plants are chasing too little demand," says Mr Harris.



Gas out, money in

The shift in the global market has left China well-placed to dictate prices. This will be another blow to Gazprom, which has long talked of exporting gas to the country. Indeed, while the Chinese and the Russians have squabbled over the terms, Turkmenistan has quietly built its own export route to China. Even if Beijing's shale-gas plans come to nothing, supplies from Central Asia and new regasification terminals along its coast may allow China to reach its natural-gas consumption targets without pricey Siberian supplies.

The glut has weakened Gazprom's position in Europe, too. It has been losing market share to cheaper Norwegian and spot-market supplies. In 2007 Gazprom talked of increasing its annual exports to the EU to 250 billion cubic metres. Now, says Jonathan Stern, of the Oxford Institute for Energy Studies, Gazprom will probably only ever supply the EU with 200 billion cubic metres a year (it shipped about 130 billion in 2008). The company forecast in 2008 that its gas prices in Europe would triple, to around \$1,500 per 1,000 cubic metres, on the back of rising oil prices, which help set prices in long-term contracts. But the price dropped to about \$350 last year and is expected to fall again in 2010. The weak market could last for another five years, believes Wood Mackenzie. Gazprom has been renegotiating with leading customers, injecting elements of spot pricing into contracts to make them more attractive.

Shtokman shtymied

Moreover, Europe's need for new pipelines to guarantee supplies suddenly looks less pressing. Construction of Nord Stream, Gazprom's flagship project to export gas directly to Germany through the Baltic Sea, will begin next month. It is due to come on stream in 2011. The scheduled doubling of its capacity to 55 billion cubic metres a year is in doubt, says Mr Stern, because Shtokman was to have supplied the gas for it.

Demand is a bigger problem. Even without recession or European shale, the assumption that Europe's consumption will keep growing is looking shaky, because the EU's efforts to boost efficiency and reduce carbon emissions are making gradual headway. Edward Christie, an economist at the Vienna Institute for International Economic Studies, says the EU could be importing a third less natural gas in 2030 than the European Commission forecast in 2005. That makes the case for additional supply lines much less compelling. The IEA expects rich European countries' demand to grow by only 0.8% a year in the next two decades, against 1.5% for the world as a whole (see chart 3).

An age of plenty for gas consumers and of worry for conventional-gas producers thus seems to be dawning. But two factors could reverse the picture again. The first surrounds the uncertainty about how fruitful shale exploration will be outside North America. A clearer understanding of the geology will emerge from pilot wells in the coming months. Second,

there are reasons for caution above ground, too. Despite natural gas's greener credentials than oil's or coal's, shale drilling has critics among environmentalists, who worry that water sources will be poisoned and landscapes despoiled.

The industry says cement casing of wells and the depth to which they are drilled make the practice safe and relatively unobtrusive. But so far it has been drilling mainly in North America, where land is plentiful and people are accustomed to the sight of oilmen's detritus. In densely populated Europe, the rapacious rate at which shale plays must be drilled to sustain production is less likely to be tolerated.

Even in America, opposition to shale gas is rising. New York state has imposed a moratorium on drilling in its portion of the Marcellus Shale, which it shares with Pennsylvania. Lawmakers in Congress want to study the ecological impact of fracking. The Environmental Protection Agency, a federal body, also raised concerns about "potential risks" to the watershed.

The path of demand in gas's new age is hard to predict, but abundant new sources could bring about profound change in patterns of energy consumption. Some of the downward pressure on price will ease: despite sedate growth, the LNG glut should dissipate, probably by 2014, says Mr Harris; and low prices will kill more projects, clearing the inventory. France's Total thinks global demand will recover strongly enough to require another 100m tonnes a year of LNG by 2020, on top of plants already planned. However, the Energy Information Administration, the statistical arm of America's Department of Energy, predicts decades of relatively weak prices.

If this is correct, it makes sense, for both environmental and economic reasons, for the country to gasify its power generation, half of which comes from coal-fired plants. This could be done cheaply and quickly, because America's total gas-fired capacity (as opposed to production) already exceeds that for coal. Put a price of only \$30 a tonne on carbon, say supporters, and natural gas would quickly displace coal, because gas-fired power stations emit about half as much carbon as the cleanest coal plants. The IEA agrees that penalising carbon emissions would benefit natural gas at the expense of dirtier fuels.

There would be political obstacles. The coal lobby remains strong in Washington, DC. Climate legislation struggling through Congress even includes provisions to protect "clean coal", a term covering an array of measures, so far uncommercial, to reduce emissions from burning the black stuff. Ironically, oil companies that were once suspicious of proposals to control carbon now regard a carbon price or even a carbon tax as a potential boon to their new gas businesses.

A more radical idea, and one that would have ramifications for the global oil sector, is to gasify transport. T. Boone Pickens, a corporate raider turned energy speculator, has launched a campaign to promote this, and has support from the gas industry. By converting North America's fleet of 18-wheeled trucks to natural gas, says Randy Eresman, boss of EnCana, a Canadian gas company, America could halve its imports of Middle Eastern oil. EnCana is promoting "natural gas transportation corridors": highways served by filling stations offering natural gas.

All this is some way off. The coal industry will not surrender the power sector without a fight. The gasification of transport, if it happens, could also take a less direct form, with cars fuelled by electricity generated from gas.

A gasified American economy would have profound effects on both international politics and the battle against climate change. Displacement of oil by natural gas would strengthen a trend away from crude in rich countries, where the IEA believes demand has already peaked as a result of the recent spike in oil prices. Another consequence of the energy market's bull run, the unearthing of vast new supplies of gas, could bring further upheaval. If the past decade was characterised by the energy-security concerns of consumers, the coming years could give even the world's powerful oil producers reason to worry, as a subterranean revolution shifts the geopolitics of global energy supply again.

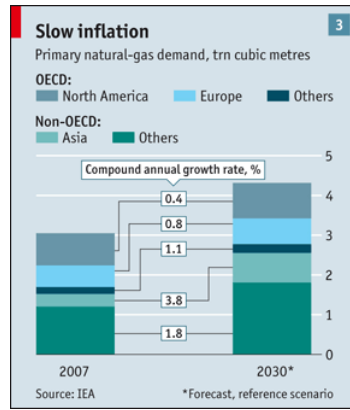
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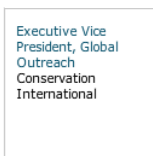


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