

# The Shale Gas Revolution

What a recent US energy discovery means for China

 By Jim Roth



Over the past few years, the discovery in the US of vast reserves of shale gas—a type of natural gas found in deep shale rocks—has transformed thinking about the American energy outlook. The US Energy Information Administration estimates that, based on current usage levels, American shale gas reserves would last for over 120 years. Besides offering newfound energy security, the environmental advantages of natural gas are attractive. Natural gas has roughly half the carbon intensity of traditional coal emissions for comparable energy output from power plants. Likewise, natural gas power generation is cleaner than coal power as measured by emissions of sulfur dioxide, nitrogen oxide and mercury, all of which threaten human health and the environment. These recent American shale developments could also have important implications for China's own energy prospects.

In the past, shale gas production would not have been economically feasible. But new techniques, such as horizontal drilling and hydraulic fracturing, have made it possible to tap previously inaccessible supplies of shale gas buried deep in rock and geological formations. Hydraulic fracturing, or “fracking,” is a method of employing hydraulic pressure to fracture the rock, thus releasing shale gas through the fissures created by the high-pressure fluids, but this process is not without controversy. In historic energy-producing states like Oklahoma and Texas, general support exists for these new technologies. However, states such as New York and Pennsylvania have seen public expressions of worry over

the potential for fresh water contamination from chemical additives used in the fracking process. The US Environmental Protection Agency is currently carrying out a national study on the possible impact of fracking on water resources.

Despite some concerns, in a short time, shale gas is expected to account for a substantial portion of American natural gas supplies. In 2009, shale gas accounted for 14 percent of the total, but the US Energy Information Administration has predicted it will make up nearly 46 percent of total US supply by 2035. In the US, many have hailed shale as an energy “game changer.”

So what does this mean for China? Shale gas—both international and domestic reserves—could turn out to be a critical element in Beijing’s plan to reduce reliance on coal, a major source of pollution. China’s status as the world’s leading emitter of greenhouse gases has been largely attributed to the fact that coal accounts for 71 percent of nationwide energy usage. Today, China is installing 900 megawatts of coal-fired generation per week and is the world’s leading importer of coal as a result.

Yet the government has set a goal to expand natural-gas fired electricity

generation and transmission as part of its shift away from coal. The 12<sup>th</sup> Five-Year Plan (just like the 10<sup>th</sup> and 11<sup>th</sup>) has meaningful objectives for cleaner energy reliance and production.

Increased reliance on natural gas could play the dual role of reducing demand for coal imports and cutting emissions, since natural gas has roughly half the carbon intensity of traditional coal.

China has worked to expand its use of natural gas in two ways. First, it has developed relationships with leading US shale gas producers. Second, it has stepped up exploration of domestic Chinese reserves. In 2009, China imported over 140 Bcf of liquefied natural gas (LNG) to meet increased demand. In that same year, the China National Offshore Oil Corporation (CNOOC) acquired a 33 percent stake in Chesapeake Energy’s oil and gas assets in the Eagle Ford and Niobrara shale reserves. The CNOOC purchase shows China recognizes the significance of the US shale gas boom, given Chesapeake is the leading driller of new oil and natural gas wells in the US.

China’s own proved natural gas reserves have skyrocketed over the last 30 years, and particularly in the last decade. In 1980, China’s proved reserves registered at just 25 trillion cubic feet (tcf). This year, China boasts 107 tcf of proved natural gas, and the EIA estimates that China’s technically recoverable shale gas resources are nearly 1,275 Tcf, a staggering amount. In an exciting recent development, PetroChina, in partnership with Royal Dutch Shell, announced in December that the company had discovered shale gas in Sichuan province.

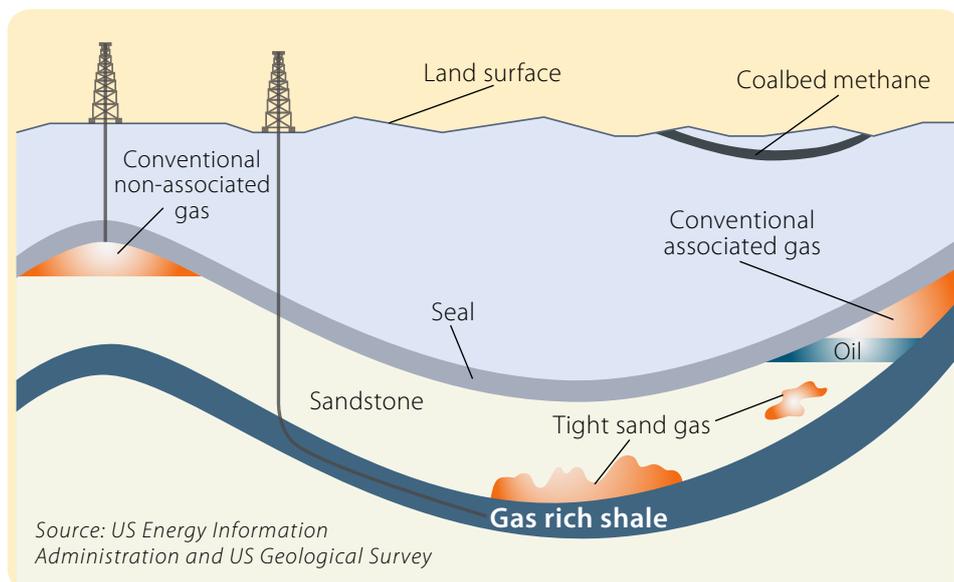
Despite China’s growing natural gas proved reserves and shale gas estimates, access to the fuel has until recently been difficult and costly. But Chinese companies have now begun to employ the techniques and technologies that made the shale gas revolution in the US possible.

These developments should come as welcome news to Beijing, particularly since the International Energy Agency recently predicted that by 2015, China will rely on foreign energy sources to supply up to 70 percent of its energy needs.

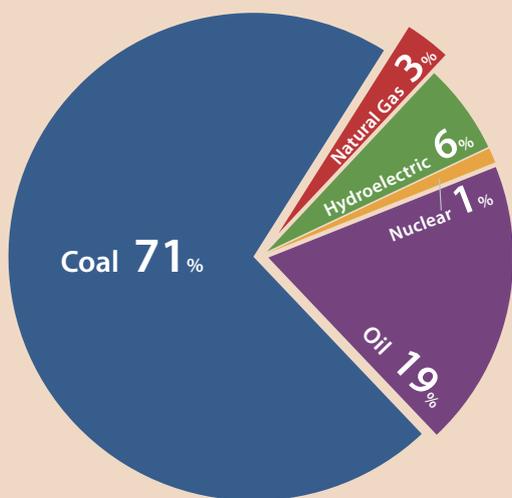
New supplies of shale gas both in China and abroad could have the effect of revolutionizing China’s energy mix, just as shale gas has dramatically changed the energy picture in the US.

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## WHERE IS SHALE GAS LOCATED?



**Total Energy Consumption in China by Type**



Source: EIA DOE International Energy Outlook