Shale revolution takes the world back to the future on fossil fuels

- BY:BRAD NORINGTON, WASHINGTON CORRESPONDENT
- From:The Australian

- July 14, 2012 12:00AM

ANY dramatic shift in the world's energy paradigm was inconceivable only a few years ago.

Global oil supplies were known to be drying up, and prices were on the rise.

Without an obvious alternative, the US and other Western nations faced an unprecedented energy security crisis for as long as they continued to depend on oil from the Middle East.

In the worst-case scenario, the US stood to lose its status as the world's largest economy and No 1 superpower.

And Europe risked further decline, especially after a failure to boost gas production, raising the prospect of future dependency on Russia to meet energy needs.

Environmental activists relished the spectacle as grim economic reality looked set to force governments and big corporations to share the green lobby's interest in reducing fossil fuels and developing low-carbon forms of energy.

But that was before the shale revolution began with technology and market forces establishing vast potential sources of gas and oil in the US and Europe.

"It's what we call the great revival of US oil production," Jim Burkhard, head of global oil research for IHS Cambridge Energy Associates, tells Inquirer.

"It's a tremendous story, it's an important story, not just for the United States but for the world, for geopolitics, not to mention the oil market."

Away from the glare of publicity and doomsayers predicting the worst, US-based energy companies scored a technology breakthrough by finding a way to extract huge, high-quality deposits of oil buried deep below the earth's surface that were previously judged too difficult and too costly to pursue.

Using advances in a process called hydraulic fracturing, or fracking, independent US companies Continental Oil, EOG and Chesapeake Energy drilled for oil across US states including North Dakota, Texas, Colorado, Ohio and Pennsylvania.

Big companies ExxonMobil, Shell, Chevron and BHP Billiton have since followed by buying into this potentially vast expanding new market.

Fracking involves drilling vertically several thousand metres beneath the surface and then curving well bores 90 degrees to run through difficult-to-access deposits of crude oil trapped between layers of shale sediments.

Highly pressurised fluid is pushed through the bores into the shale, allowing trapped crude oil and natural gas to escape and flow to the surface.

In 2008 the US imported 60 per cent of its oil for vehicles and industry. Imports now stand at 45 per cent, in large part because of the shale oil boom. Production has increased 1.3 million barrels a day in three years, more than double that of Russia.

The geographical area of much interest has been the "Green River Formation" stretching across Colorada, Utah and Wyoming that contains the world's largest oil shale deposit.

US-based research group Rand Corporation has estimated that about half of the deposit could eventually be extracted, or 1.5 trillion barrels of oil.

This figure, equivalent to the world's entire proven oil reserves, has stirred excited talk of the US becoming entirely self-sufficient for its energy needs in 15 to 20 years -- and potentially a big exporter of oil.

A report this week by Mark Mills from conservative American think tank the Manhattan Institute says the US is poised to become a dominant energy player, supplanting the Middle East.

"In collaboration with Canada and Mexico, the United States could -- and should -- forge a broad pro-development, pro-export policy to realise the benefits of our hydrocarbon resources," Mills writes. "Such a policy could lead to North America becoming the largest supplier of fuel to the world by 2030."

The most ambitious forecasts suggest the Green River Formation could provide enough US oil supplies for 200 years, guaranteeing the nation's economic prosperity and confirming its supremacy in a changing world order as China and India rise.

Freed from the grip of Middle East oil, the US could recast its relationship with Saudi Arabia. It could tighten economic pressure on Iran to refrain from developing a nuclear arsenal if the Islamic regime's funding from petroleum exports diminished.

Walter Russell Mead, a foreign policy expert from New York's Bard College, writes in The American Interest magazine this month that a geopolitical revolution has begun during the past 12 months that is bigger and more consequential than the Arab Spring, despite little media attention.

Mead says a "new age of abundance for fossil fuels is upon us" and that will shift the centre of gravity in global energy from the Middle East to North America.

"It will rearrange the global chessboard, improving the position of some powers, weakening others," he writes. "It is a powerful boost to American power, reducing America's strategic and economic liabilities while adding considerably to its assets."

While the US stood to benefit from potential production of one trillion barrels of unconventional shale oil, Canada too would become an energy giant with almost two trillion barrels of conventional oil and gas extracted from its rich tar sands.

The biggest losers, according to Mead, would be the Gulf petro-states and Russia. The Middle East's political power would not disappear because its nations would still have the world's cheapest oil to sell. "But it won't be the same," Mead writes. Meanwhile, Russia would seek to rebuild its power based on huge natural gas reserves that would keep capital flowing to Moscow. "But it could lose its ability to stop the flow of natural gas into Western Europe."

Mead acknowledges these changes would not happen overnight -- but he points to the oil boom already under way in North Dakota, where oil production is up by almost 500,000 barrels a day, as evidence of changing international trade patterns.

Burkhard is among industry experts still cautious about talking up the Green River Formation just yet because the bulk of material extracted from its wells is kerogen, a petroleum compound that requires expensive heating treatment to yield a relatively small amount of commercially viable oil and gas.

"It's a huge resource," he tells Inquirer. "And if you set aside economics, there is a lot of that stuff in rock around the world, particularly in the western part of the United States. It is just very high cost."

In the absence of improved methods, the economics of extracting kerogen in Colorado boil down to supply-side economics: the more expensive Middle East oil becomes, the more viable drilling for kerogen will become.

Burkhard does not write off the potential for improvements in technology that would make drilling for kerogen in areas such as Colorado economically feasible -- but he says it's probably a long way off. "It has a potential to increase production . . . there's no commercial production of (kerogen) right now."

The turning point for smaller independent companies that have led the way came four to five years ago when they realised they could apply advanced fracking techniques used for natural gas drilling to also extract crude oil trapped in non-kerogen shale.

Europe's total shale oil and gas resource is estimated to be close to those of the US, but there are serious obstacles to extraction because it is mainly kerogen.

There are other problems that put Europe's land-locked oil and gas out of financial reach for now: known reserves lie beneath high-density population areas; infrastructure needed to make mining economical is often absent; regulations limit the scope for oil companies to drill; and local communities are wary of possible damage to the environment after claims that drinking water would be contaminated by chemicals used underground in fracking.

Europe will need new gas production to come on stream during the next decade -- most likely shale gas -- if it is to avoid dependency on high-priced Russian gas for the long term when North Sea reserves start drying up. In Germany particularly, the issue is politically vexing as local gas production has declined to 14 per cent of annual consumption and the Greens push hard for greater reliance on non-carbon energy.

A report issued last month by Germany's Institute for Geosciences and National Resources said several trillion cubic metres of shale gas reserves could be extracted by fracking, providing proper rules were followed.

Poland is Europe's frontrunner for shale gas development, although ExxonMobil's decision last month to cease exploration after two wells failed to demonstrate commercially viable flow rates has created new doubts. Israel's significant gas reserves could assure its energy future, but it also faces difficulties associated with kerogen.

Prospects for Dakota-style "tight oil" production outside the US are greatest in China, Russia and Argentina, which have large non-kerogen crude deposits. Australia has large areas of shale that could double its current gas reserves, although extraction could be difficult and exploration remains at an early stage.

The US has fewer of the concerns of its competitors. The Green River Formation lies beneath federal land in mostly arid areas, allowing easy access if kerogen can be made commercial.

In Dakota and Texas where the oil boom is happening, most of the land is privately owned and free from regulation. The US Environmental Protection Authority has so far sided with oil companies, finding the risk to groundwater from fracking minimal, and no definite link between fracking and earthquakes.

"The United States has the right conditions that have allowed these resources to be developed, and developed in a big way," Burkhard says. "Private ownership of mineral rights makes the United States unique. You can go to farmer Joe in North Dakota and say, 'Farmer Joe, I want to drill on your land, and if I find something, you're going to get a cut.' You align the interest of the landowners with the investors."

The emerging US oil boom clearly has OPEC cartel countries worried. They face a balancing act in keeping prices high, aware that doing so will only encourage more development of unconventional shale oil that will reduce American dependence.

Panic has gripped environmental activists. Writing in The Guardian this month, George Monbiot conceded a new oil boom had begun and all predictions of global supplies facing terminal decline were wrong.

"The problem we face is not that there is too little oil but that there is too much . . . there is enough oil in the ground to deep-fry the lot of us, and no obvious means to prevail upon governments and industry to leave it in the ground," Monbiot said.

The new boom presents a potential problem for the Gillard government in Australia as it imposes a carbon tax starting at $23 a tonne. Climate Change Minister Greg Combet's argument that pricing pollutants will provide a strong incentive to move to clean energy sources sits oddly with a US-led global drive for more oil.

Even President Barack Obama has backed away from carbon-reducing policies to push domestic oil production as the solution to America's energy security.

The US will remain vulnerable to oil price spikes for many years because oil is traded globally with prices set by the international market. But oil is here to stay -- in a big way.