

## C25 Is Fracking the Key to Americas Achieving Energy Independence Via Natural Gas Production?

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The goal of this presentation is to educate attendees regarding energy production and forensics needs.

This presentation will impact the forensic science community by providing education concerning fracking and other natural gas resources issues.

America's need for oil from the Middle East has driven U.S. foreign policy for generations and has benchmarked the price we pay for domestic energy. Suppose that over the next decade the U.S. could become energy self sufficient or a net exporter of energy. Such an outcome could reconfigure our national security and foreign policies. It could also produce a revolution in our ability to restore the U.S. as a manufacturing powerhouse fueled by low cost energy. Natural gas prices, which have ranged from \$2 to \$12 per thousand cubic feet over the last decade, are currently \$3 to \$4 in the U.S. versus \$12 in Europe. This low current domestic price is largely due to the increased production of shale gas.

What has changed to suddenly make such previously outlandish outcomes possible? The answer is that advances in directional drilling and the application of a long-standing technique called hydraulic fracturing or "fracking" have enabled U.S energy production companies to tap and produce vast quantities of natural gas and oil resident in massive subsurface shale formations located in various parts of this country which are economically unproductive without the application of fracking. There are at least ten regions in the U.S. in which "shale plays" are currently active. These include the Bakken formation in the Dakotas and the Marcellus formation along the East Coast.

In fracking, a vertical well is drilled, usually thousands of feet below the level of any aquifers present. The well is encased by a steel pipe, which is further encased by cement. Fluid is pumped at high pressure into the well and is conveyed to the shale formation where it opens avenues for oil and gas removal. The fractures are kept open by solids (sand) pumped in with the fracking fluid. Directional drilling allows one drill pad to gather oil and gas from many directions using one vertical well, making the process more economically attractive.

According to the U.S. Energy Information Administration, within 25 years shale gas production is slated to equal or exceed natural gas production from all other sources combined. Annual U.S. natural gas production in this country is estimated to reach 33 trillion cubic feet by 2040, up from 23 trillion cubic feet in 2011. U.S. natural gas production is not expected to plateau until 2040.

As with any new application of previously proven technology, there are risks as well as rewards associated with this opportunity. Some of these risks are detailed below:

- Fracking requires large quantities of water. This raises questions regarding water availability, particularly in arid regions. In the West, the water from the Colorado River is very close to being oversubscribed. The fracking fluids can carry contaminants from the subsurface rock matrix back to the surface. Can the water used be cleaned up and reused? Will fracking contaminate the ground water? How will the vast quantities of fracking fluids be disposed of?
- Gas emissions into the atmosphere, from drilling and fracking operations, are of concern. These emissions can include methane, radon, and other gases.
- In populated regions, truck traffic, noise, smells, the presence of unsightly operational hardware such as pumping stations and storage tanks, and the loss of privacy can stimulate negative reactions from neighbors.
- Numerous legal and regulatory issues manifest themselves. In many states the mineral rights are treated as a separate entity, not the property of the homeowner. Multiple regulatory organizations are vying to regulate the use of fracking. These include homeowner groups, cities, states, and the federal government.
- Economic issues are critical. How much natural gas resource is available at what extraction and transport cost?

For most of the above problems there are solutions, but a paramount question is: can the public trust that the solutions will be properly applied? A number of the above topics will be addressed by the speakers that follow.

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Forensics fits into this picture when there is a problem or a mishap. The forensics discipline needed might be in the area of geology, engineering, environmental, or some other area.

Fracking, Energy, Gas