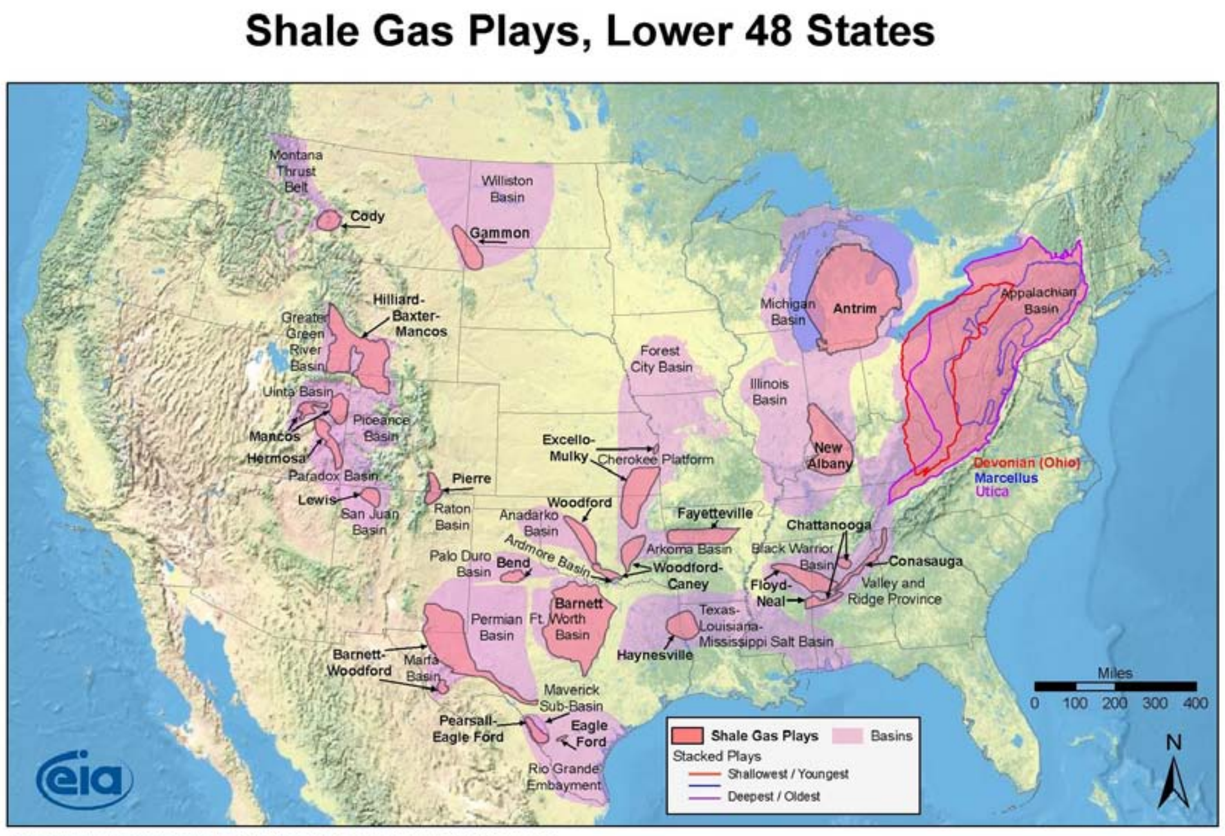
Hydraulic Fracturing & Frac Sand

History: The use of horizontal drilling in conjunction with hydraulic fracturing has greatly expanded the viability of producers to recover natural gas and oil. Application of fracturing techniques to stimulate oil and gas production began to grow rapidly in the 1950s. Practical application of horizontal drilling to oil production began in the early 1980s, by which time the advent of improved downhole drilling motors and the invention of other necessary supporting equipment, materials, and technologies had brought some applications within the realm of commercial viability.

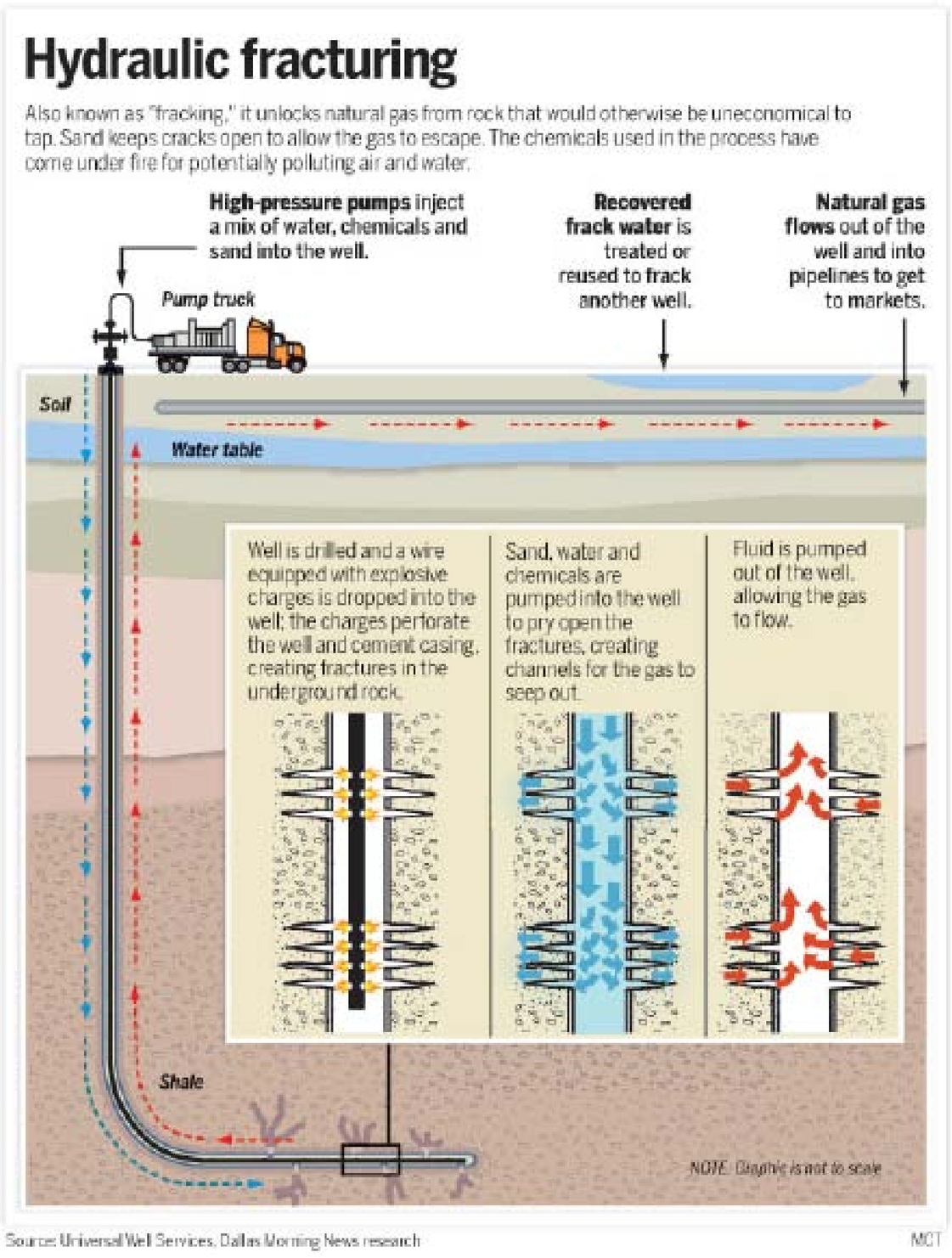
Shale Gas, Game Changer?: Although the U.S. Energy Information Administration's (EIA) National Energy Modeling System (NEMS) and energy projections began representing shale gas resource development and production in the mid-1990s, only in the past 5 years has shale gas been recognized as a "game changer" for the U.S. natural gas market. The proliferation of activity into new shale plays has increased dry shale gas production in the United States to 23 percent of total U.S. dry natural gas production, in 2010. Wet shale gas reserves increased to about 21 percent of overall U.S. natural gas reserves, now at the highest level since 1971. Oil production from shale plays, notably the Bakken Shale in North Dakota and Montana, has also grown rapidly in recent years.

Reducing the Dependence on Foreign Oil: Of the natural gas consumed in the United States in 2009, 87% was produced domestically; thus, the supply of natural gas is not as dependent on foreign producers as is the supply of crude oil, and the delivery system is less subject to interruption. The availability of large quantities of shale gas will further allow the United States to consume a predominantly domestic supply of gas.



Source: Energy Information Administration based on data from various published studies
Updated: May 28, 2009

How Much Natural Gas Does the U.S. Have?: According to the EIA Annual Energy Outlook 2011, the United States possesses 2,543 trillion cubic feet (Tcf) of potential natural gas resources. Natural gas from shale resources, considered uneconomical just a few years ago, accounts for 862 Tcf of this resource estimate, more than double the estimate published last year. At the 2010 rate of U.S. consumption (about 24.1 Tcf per year), 2,543 Tcf of natural gas is enough to supply over 100 years of use. Shale gas resource and production estimates increased significantly between the 2010 and 2011 Outlook reports and are likely to increase further in the future.



Industry: While industrial sand had a variety of uses, including molding, fracturing, abrasives, and miscellaneous applications, most of the production in this industry category was destined for glass making. In 2009, domestic production of industrial sand and gravel totaled 24.7 million tons and was valued at an estimated $827 million. Industrial sand made up about 96 percent of product by tonnage; gravel accounted for the other four percent. By tonnage produced, the leading states were Texas, Illinois, Wisconsin, Minnesota, Oklahoma, California, North Carolina, and Michigan. These eight states combined to produce about 61 percent of the domestic supply of industrial sand and gravel in 2009.

Percent Use in 2009 by Industry
Glassmaking sand: 31%
Hydraulic fracturing, well-packing, and cementing sand: 27%
Foundry sand 14%
Whole-grain fillers and building products 7%
Whole-grain silica 4%
Golf course sand 3%
Silica for chemical applications 3%
Other uses 11%

Role of Frac Sand: During the hydraulic fracturing process high-pressure pumps inject a mix of water, chemmcals, and sand into the well. The fractures in the rock, previously created by explosives in the well, are held open by the mixture creating channels for the gas to seep out. The fluid is pumped out of the well, leaving behind the spherical shaped frac sand. The gas is able to flow between the spherical sand particles out of the well.

Economic Impact to Western Wisconsin: Historically high prices for Frac Sand have spurred development projects across the Midwestern United States Region. Mining and processing costs range from $50-65 per ton. These costs depend on the quality of sand and the amount of processing necessary, as well as the depth of the mine the material is extracted from. Also includes cost of drying the sand after it has been removed from the ground, some mining operations opt not to dry their sand for easier, more compact transportation, opting to dry the sand on site before fracing. Total cost including transportation costs range from $125-$350 per ton. These costs depend mostly on distance of transportation but also include whether the sand has been dried, and how the material is being transported.