Shale Gas Development Challenges – A Closer Look

Water

Key Points:

- As with conventional oil and gas development, requirements from **eight federal** (including the Clean Water Act) and numerous **state and local environmental and public health laws** apply to shale gas and other unconventional oil and gas development. Consequently, the fracturing of wells is a process that is **highly engineered, controlled and monitored.**
- Shale gas operations use water for **drilling**; water is also the primary component of **fracturing fluid**.
- This water is likely to come from rivers, lakes, ponds, groundwater aquifers, municipal supplies, reused wastewater, or recycled water from earlier fracturing operations. Operators are guided by all **applicable laws and regulations** in water acquisition.
- As much as **10 million gallons** may be pumped into a single well. Although this amount is relatively small when compared to other major water uses (such as agriculture), its cumulative effect could impact aquatic habitats or water availability, especially where water is a limited resource.
- A number of studies and publications caution that surface and **groundwater contamination remains a risk**; some studies document contamination from above-ground chemical spills, leaks, wastewater mishandling and other incidents. How significant these risks are over the long term is presently unclear and in need of continued study.

Although closely monitored at all stages, the fracturing of shale wells requires **large amounts of water**. However, this amount of water is considered relatively small when compared to other major uses, such as agriculture and industrial purposes.[1] Operators are pursuing a variety of techniques, including recycling and reusing produced water, to reduce freshwater demand. Research is under way to find improved methods of treating fracture flowback water so it can be reused more effectively. In some areas of the country, significant water use for shale production may affect the availability of water for other uses. The **National Petroleum Council** (NPC) has concluded some "widely publicized instances of water wells being contaminated by methane" are unrelated to hydraulic fracturing and due instead to drilling encountering "shallow geologic zones" containing natural gas, which migrated to drinking water aquifers and domestic wells *("Prudent Development: Realizing the Potential of North America's Abundant Natural Gas and Oil Resources,"* page 195). Additionally, the Environmental Protection Agency is expected to release a report in 2014 that examines, among other things, hydraulic fracturing and potential drinking water impacts.

Left: The lifecycle of water associated with shale gas development. Water supply (top, usually either surface or ground water, is mixed with small amounts of chemical additives and pumped under pressure into the well. The water must be transported (bottom) and storage (middle) in impoundments occurs at or near well sites. After use the water is captured, reused, treated and discharged, or disposed of in an approved manner. More and more companies are utilizing tanks for storage to avoid potential problems of seepage and spillage.

[1] Massachusetts Institute of Technology, "MIT Study on the Future of Natural Gas," June 6, 2011, Chapter 2: Supply, pages 43-44.