Shale Gas Development Challenges – A Closer Look

Air

Key Points:

- Air quality risks from shale oil and gas development are generally the result of: (1) dust and engine exhaust from increased truck traffic; (2) emissions from diesel-powered pumps used to power equipment; (3) intentional flaring or venting of gas for operational reasons; and, (4) unintentional emissions of pollutants from faulty equipment or impoundments.[1]

- Natural gas is efficient and clean compared to other fossil fuels, emitting less nitrogen oxide and sulfur dioxide than coal and oil, no mercury and very few particulates. However, the drilling process potentially can release chemicals such as **benzene** as well as **methane**, a very reactive greenhouse gas. Data in this area is lacking and currently under study.

- The Environmental Protection Agency (EPA) in 2012 finalized **New Source Performance Standards** that set the first air pollution standards for natural gas hydraulic fracturing operations. The new rules, which also include performance standards for other modified oil and natural gas operations, are slated to become effective in 2015.[2]

[1] Government Accountability Office, "Unconventional Oil and Gas Development: Key Environmental and Public Health Requirements," September 2012, page 33.

[2] National Conference of State Legislatures, "Natural Gas Development and Hydraulic Fracturing: A Policymaker's Guide," June 2012, pages 3-4.

The sources of potential air emissions associated with shale gas production can occur at the drill site during drilling and fracturing, and at ancillary off-site facilities such as pipelines and natural gas compressors. The onsite emissions include **dust** and **diesel fumes**, **fine particulate matter** and **methane**.[3] Hydraulic fracturing operations use large amounts of horsepower, provided almost exclusively by diesel engines. **Volatile organic carbon compounds (VOCs)** from natural gas production are a primary concern because they can combine with nitrogen oxides (NOx) to form **smog** and contribute to elevated levels of **ozone** in the atmosphere. The contribution of shale gas activities to these levels is not well known and is being studied further. Methane is a strong **greenhouse gas** and might be released during the drilling, fracturing, flowback and production phases of shale gas development. Onsite **fugitive emissions** of methane may take place from other sources as well. Trucks are often used to transport water and/or fluids used in the hydraulic fracturing process. Where feasible, operators are increasingly turning to temporary surface **flowlines** to transport fresh water to impoundments and well sites, resulting in a subsequent decrease in truck traffic. Additionally, **multi-well pads** allow centralized water storage and management of flowback water, reducing truck transport. In an effort to both lower costs and improve environmental performance, some of North America's largest oil and gas field service companies are converting drilling rig and truck engines to run on liquefied natural gas (see The Wall Street journal, "Drillers Shift to Use of natural Gas," Dec. 25, 2012, http://online.wsj.com/article/SB10001424127887323291704578199751783044798.html?mod=WSJ_qtoverview_wsjlatest).

Left: Engine exhaust from increased truck traffic can be one of the air quality risks associated with development of shale gas. Photo: Doug Duncan, U.S. Geological Survey

Right: A dust release from a sand refill truck, identified by the National Institute for Occupational Safety and Health (NIOSH) as an inhalation health hazard. Photo: Centers for Disease Control and Prevention

[3] The Energy Institute at the University of Texas at Austin, "Fact Based Regulation for Environmental Protection in Shale Gas Development," February 2012, page 27.