RESPONSIBLE AND SUSTAINABLE NATURAL GAS RESOURCE DEVELOPMENT:
TURNING PRINCIPLES INTO ACTION

Introduction

The American Gas Association (AGA) has been an outspoken supporter of sustainable and responsible development of the rich endowment of natural gas energy available in North America. Even though AGA is not an advocate for natural gas producers directly, the association recognizes the benefits of a strong domestic production position to local gas utilities and natural gas consumers. To that end, the AGA board of Directors published a set of resource development principles in May 2011 that called on producers of natural gas to engage stakeholders, establish best practices and, importantly, communicate their actions to the public.

Today, natural gas producers are on that path. In fact, just as the debate surrounding water and air quality issues, community impacts and other challenging elements of gas production becomes part of the public domain it seems that producers are already taking steps to mitigate the influence of the production footprint. Of course, this is not occurring in a vacuum. Federal and state regulatory agencies and other interested third parties are vested in the responsible and sustainable development of America’s natural gas resource, also. This brief report points to tangible evidence of the work underway and the new and best practices that natural gas producers are developing and implementing on a daily basis. With that said, the work is not yet finished. This accounting is only the tip of the iceberg regarding critical environmental remediation strategies. The fact is that producers, state regulators, local officials and federal authorities have taken seriously the call to develop the abundant natural gas resource in the United States responsibly and sustainably.

Without question, consumers have benefited enormously from the growth of new natural gas supply sources in terms of reliability, lower prices and price stability. As these benefits are realized, it is critical to examine the practices being applied to resource extraction that are responsible for effectively managing some of the most crucial impacts of this industrial process.
Natural Gas Industry Initiatives Turning Responsible Resource Development into Actions

1. Reducing surface footprint and community impacts.

- The U.S. Department of Energy (DOE) has estimated that the footprint of four horizontal wells operating from a single pad and recovering the same volume of gas as that from 16 vertical wells on multiple pads presents only 10 percent of the surface disturbance for pad construction, roads and other support activities such as truck and heavy equipment traffic, as demonstrated by the vertical wells. Horizontal drilling of multiple wells from single pads for shale development is now considered an industry standard practice.

- Modular techniques and slimhole drilling technology today mean that an equal amount of natural gas can be developed with rig equipment as much as 75 percent smaller and lighter than just 15 years ago, thus reducing the surface impact of many drilling operations.

- Where practical, pipelines are being used to supply water and remove waste water, therefore, reducing truck trips on rural and other roads.

- Best practices for installing sound barriers, fencing and landscaping are being employed, particularly in urban settings such as in the Dallas-Fort Worth area of Texas through programs such as the “Best on the Block” initiative.

2. Assuring well integrity.

- All oil and natural gas wells are lined with steel pipe (casing) and ultimately cemented in order to protect the integrity of the wellbore. American Petroleum Institute (API) specifications are in place to establish parameters for the length, thickness, tensile strength and composition of the casing. The resulting closed system is the primary subsurface protection for the environment beyond the well.

- Like qualifications for the steel pipe noted above, standards are also in place for the cement and additives used when casing strings are added to the well structure. When cementing a casing string in place, cement is pumped down the inside of the casing and squeezed up the space between the steel casing and the wall of the wellbore. Subsequent Cement Bond Logs or Variable-Density Logs can be used to examine the quality of the bond created between the steel casing and the wellbore after cement has hardened. Virtually all states for which there is natural gas production have permitting and planning requirements for natural gas producers that pertain specifically to well integrity.
3. Disclosure of chemicals used in hydraulic fracturing treatments.

- Disclosure of the chemical constituents of hydraulic fracture treatments is rapidly becoming standard industry practice. Initiatives such as FracFocus.org sponsored by the Groundwater Protection Council (GWPC) allow interested persons to research fracture fluid chemistry on a well-by-well basis.

- By way of example, the Texas Railroad Commission (RRC) now requires the operator of a well permitted, drilled and completed in Texas, beginning February 1, 2012, to disclose the chemicals used in the hydraulic fracturing process to FracFocus.

4. Protecting water quality through rigorous monitoring and mitigation strategies.

- The number of regulatory requirements and mitigation strategies directed toward well site management and water quality issues associated with shale gas development is extensive.

- The federal Clean Water Act regulates surface discharges of water associated with shale gas drilling and production, as well as storm water run-off from production sites.

- States such as Pennsylvania hold a well operator responsible (subject to fines and other actions) for detected pollution of a water supply within six months of operations and within 1,000 feet of the drill site. Such a mandate encourages baseline testing of water resources for the protection of the state, the landowner and drilling company.

- For any state involved in gas production, the regulation, monitoring and mitigation impact analysis of erosion control, pre-drill water sampling, wetland permitting, stream crossing permitting, water withdrawal permitting, pit/impoundment permitting, and water management plans are key elements of state authority.

- The proper setting of casing strings is the primary protection for subsurface water resources in natural gas development areas. The steel pipe and cement bond creates a closed system by which the well can be stimulated and ultimately produced without engaging aquifers and other subsurface features. The enforcement of the federal Clean Water Act and additional state and regional regulations are the primary tools for protecting surface water resources.
5. Minimizing fresh water use.

- Sources of water for hydraulic fracturing normally originate from surface water bodies such as streams, rivers, lakes and ponds (primary sources of water in Pennsylvania, for example) or from underground sources, as is the case in the Dallas/Fort Worth area of Texas. No matter the source, industry has turned more and more to well site recycling of recovered fracturing fluids and other system management techniques.

- A consortium of companies has formed the Barnett Shale Water Conservation and Management Committee to discuss industry water use and conservation of water resources, as well as management of freshwater resources.

- Beyond recycling of fracture fluids, the idea of using brackish water sources rather than fresh can appeal to those trying to limit fresh water withdrawals from a region for hydraulic fracturing jobs. In fact, time is an ally as natural gas producers and other industry players search for viable alternatives and technology enhancements that reduce the water footprint of drilling and production operations.


- Surface impoundments for drilling and fracture fluids must be constructed in accordance with existing regulations. Impoundment design creates an impervious barrier against infiltration into the subsurface. Material recovered from impoundments are reclaimed, recycled or disposed.

- Flowback water from hydraulic fracturing treatments is managed differently depending on the region. In the Barnett, Fayetteville, Haynesville, Woodford, Antrim and New Albany producing areas the primary disposal method is deep injection into existing saline aquifers. In other cases, particularly in the Marcellus shale in Pennsylvania, flowback waters are aggregated, treated and/or recycled or transported for disposal in other jurisdictions. The business of recycling is becoming big business in eastern and other states.

7. Minimizing air emissions.

- More than 70 exploration, transmission and distribution companies are part of EPA’s Natural Gas Star program, which seeks to identify best practices that reduce emissions in many applications and strives to disseminate critical technologies to industry.

- Green well completions that utilize liquid and gas separation equipment to capture potential methane emissions are rapidly becoming the standard for all drilling and production operations beyond initial exploratory wells. The process makes environmental and economic sense for natural gas producers. A new EPA rule will mandate capture equipment where it is safe and feasible to use.
States such as Colorado already require operators to employ sand traps, surge vessels, separators and tanks to maximize resource recovery and minimize methane releases to the environment where economically and geologically practical. Even though efforts to limit on-site methane emissions have been recognized through industry and other awards for a decade or more, it is only now getting public attention, as is the recycling of fracture fluids.


- The objective of Environmentally Friendly Drilling (EFD) is to identify, develop, test and distribute innovative technologies that reduce the impact of oil and gas development activities.

- A January report from the Bipartisan Policy Center in Washington, DC includes a comparison of recommendations from the U.S. Department of Energy’s, Secretary of Energy Advisory Board (SEAB) and the National Petroleum Council (NPC) that calls for the establishment and implementation of industry best practices tied to shale gas. Each of these government and industry entities calls for the development of regional centers of excellence targeting resource development best practices in their own way. The natural gas producing industry is engaged to meet that mission with the goal of defining and implementing sensible best practices across the country.

9. Securing community consent and engaging all stakeholders to meet economic, environmental and regulatory goals, while sharing information transparently.

- The Barnett Shale Energy Education Council (BSEEC) is a community resource that provides information to the public about natural gas drilling and production in northeast Texas. The organization provides information about drilling in urban environments and promotes best practices in operations and community relations.

10. Enhancing regulatory strength in natural gas producing states and localities by addressing funding sources, manpower and other resources dedicated to regulatory constructs and environmental remediation.

- Many states have recently or are now undergoing reviews and audits of environmental regulations associated with oil and gas development through STRONGER (State Review of Oil and Natural Gas Environmental Regulations), which is a multi-stakeholder organization dedicated to examining and documenting key environmental regulations across the country.
The importance of properly managing information produced from oil and gas operations and environmental measures cannot be overstated as critical for regulatory implementation. Databases like the GWPC Risk Based Data Management System (RBDMS) provide a platform for managing oil and gas production data, the location of wells, well construction details, inspection reports and monitoring data.

As shale operations have increased in key states, so has the number of people dedicated to permitting, compliance and enforcement of existing and emerging laws. Funds for these incremental manpower increases are often generated by increasing permit fees and other surcharges to operators.

The petroleum exploration and production sector spent $38.7 billion from 1990-2009 on environmental remediation commitments in the United States. For the same period, the entire petroleum industry spent $209 billion with $100 billion dedicated to air quality; $45 billion to water quality; $22 billion directed to remediation and spills; $15 billion to waste products; and, $27 billion to other strategies.

Protecting the environment and asking questions are critical elements of natural gas resource development in America. This brief accounting of natural gas producer actions aimed at environmental protection, well system integrity, stakeholder engagement and regulatory compliance highlights only a few of the measures taken to integrate responsible and sustainable practices in the development of the vast natural gas resource base in the United States. There are many more. However, there are also many more challenges to be met.

All stakeholders have a keen interest in demonstrating that natural gas production can be done safely, reliably and sustainably, while minimizing and managing environmental impacts. A discussion of science-based facts and a full understanding of those protections in place today, as well as the challenges ahead, should be the foundation on which this future is determined.
Sources

1. Addressing the environmental Risks from Shale Gas Development, Worldwatch Institute, Mark Zoback, Saya Kitasei, Brad Copithorne, July 2010.


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