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Shale gas: Can we safely tap a huge resource?

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The emergence of the North American shale-gas resource is the most positive event in the U.S. energy outlook in 50 years. But realizing this opportunity will require cooperation between industry and regulators on a new commitment to data-driven best practices that will lead to a continuous improvement in environmental outcomes.

As big as the opportunity is, the emergence of shale gas has stirred opposition and uncertainty. The fundamental question is how to exploit this resource in an environmentally responsible manner. Done properly, the economic benefits are enormous. But if it is done poorly — or, perceived as being done poorly — public opposition will slow or stop its growth and return the country to a trend of increasing dependence on higher-priced imported natural gas.

Natural gas provides a quarter of the U.S. energy supply. Shale gas has grown from less than 2 percent of domestic natural gas production in 2001 to almost 30 percent today and is expected to be 45 percent by 2035. Hundreds of thousands of Americans are employed in its production, from Wyoming to Texas to Pennsylvania. This abundant domestic supply of a fuel with cleaner-burning characteristics than oil or coal has meant, since 2009, that consumers' costs of natural gas to heat homes or generate electricity have fallen by more than half.

There are also national security benefits as shale-gas production expands, increasing the diversity of supply and reducing future dependence on major natural-gas resource holders such as Russia and Iran. The growth of domestically produced shale gas has already saved tens of billions of dollars on our balance of payments.

Shale gas and associated hydrocarbon liquids are produced by hydraulic fracturing, or "fracking." One million to 5 million gallons of fracking fluid — a mixture of water, sand and chemical additives — is injected along horizontal pipe extending a mile or more, several thousand feet underground. Although some are concerned that fracking fluid can contaminate shallow underground drinking-water supplies, the distance between deep shale-gas deposits and water aquifers makes the likelihood of such contamination remote.

But there are other environmental impacts from shale-gas production: the disposal of waste water produced from the well, air emissions, community disruption from truck traffic and considerable surface activity, and the longer-term regional consequences of unplanned development as wells are drilled.

In January, Energy Secretary Steven Chu formed a subcommittee of his advisory board on natural gas. In March, President Obama declared that "recent innovations have given us the opportunity to tap large reserves — perhaps a century's worth" of shale gas and called for the subcommittee to identify steps to reduce the

environmental impacts of shale-gas production.

The subcommittee, which I chaired, presented recommendations this week that would give the public, regulators and industry a measurable way to monitor progress in reducing current and potential environmental impacts of shale-gas production, not just from fracking.

The proposed approach relies on increased measurement, public disclosure, and a commitment to continuous improvement in the development and environmental management of shale gas. Validated data on such indicators as the composition of produced water, background water quality, methane leakage to the atmosphere and well completion will meet key needs: helping regulators set and enforce limits, leading industry to more efficient operations, and providing the public with information on systematic trends to compare with individual reports of environmental damage.

Our work with state and federal regulators, industry representatives and the public convinces me that two approaches will not work. The first is the view that existing and planned regulation adequately protects the public interest, and that the adverse environmental impacts are minor and compare favorably to energy sources such as coal. Even if the public accepted this view, industry can and should be expected to do better as technology advances and field experience accumulates.

The second view is that prescriptive regulation is the only way to protect the public interest from a company's profit and cost-cutting motives that can result in environmental damage. Regulation with inspection and enforcement, supported by adequate resources and personnel, is needed to protect the public. But the current regulatory system — with conflicting state and federal responsibility and under-resourced regulatory agencies — leads to overly detailed prescribed standards that do not have the flexibility to adapt to different geologies, technology innovations and accumulated field experience.

There must be a shift to a data-driven process that relies to a greater extent on performance-based standards, where a company certifies compliance and is assessed fines for violations at levels that vary with frequency and severity. For example, shale-gas well-
cementing and completion regulations should not specify how a well should be completed but, rather, how a completed well should perform under specified tests.

The subcommittee recommends that industry establish a national technical organization to encourage the development and diffusion of best practices — recognized improvements to techniques and methods based on measurement and field experience. Documented best engineering practices are an important way to track improved operational and environmental results over time. The national organization could work through regional subgroups because of the diversity of shale deposits and regulatory practices across the country. Meanwhile, coordination and shared learning among state regulators should be further augmented.

Industry leaders know that their economic success depends on good environmental stewardship. And there are many cases where more efficient shale-gas practices and improved environmental outcomes are aligned. A prominent example is the move from drilling single wells to drilling multiple wells from a single "pad," which greatly reduces the drilling footprint and truck traffic.

Shale gas is in an early stage of development. Tremendous technical change is likely that will make the production process much more efficient. One example is reducing water usage by a factor of two to four for a given amount of production, which has significant environmental benefits, direct and indirect.

To derive the greatest benefit from this abundant new resource, its development has to be done right.

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