INTERNATIONAL GAS UNION

Unconventional Gas: From Perplexity to Confidence. Concerns versus Facts

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KEY FINDINGS

- The shale gas development in North America is more than a game changer, it is a revolution. Its consequences for the local economies cannot be overestimated and its environmental benefits are proven.
- The share of unconventional gas in the global gas production is expected to reach 32% in 2035. Altogether, the unconventional gas supply may represent nearly 2/3 of the incremental gas supply to 2035.
- Unconventional gas supply has changed our understanding of the global distribution of the energy resource base. Substantial resources are available not only in North America but in Australia, Europe, Latin America, South Africa and China, among others.
- To develop this potential, the gas industry and governments have to cooperate asserting stable policy and regulatory frameworks.
- The rapid development of unconventional gas has however attracted controversy, mainly because of the misinformation concerning real environmental impacts of the extraction process.
- A rational and objective discussion is required. IGU proposes a fact-based assessment of the key environmental concerns that have surfaced related to shale gas.

The US shale gas experience: substantial benefits for the national economy

The shale gas revolution has changed the supply outlook for natural gas, and has reinforced the crucial role of natural gas in the global energy mix. Its impact on the US domestic economy cannot be overestimated: consumer energy costs were reduced, GHG emissions were trimmed, an impressive number of new jobs were created, Federal, State and local tax revenues were bolstered and large industrial projects were triggered in the production of petrochemical and fertilizers. For some, the country is now on the verge of energy independence.

The unconventional energy development in the US provided an extraordinary surge in jobs creation and economic growth (IHS Global Insight, figures 2012), to help the country dealing with slow economic recovery following the 2008 recession. The unconventional oil and gas industry is expected to provide 3 million high-paying jobs by 2020, and to invest more than $5.1 trillion in capital expenditures between 2012 and 2030 ($3 trillion for unconventional natural gas). Since the technology, tools and know-how for developing these resources are domestic, an overwhelming majority of every dollar spent throughout the supply chain remains in the country to support domestic jobs. On a cumulative basis, unconventional activity will generate $2.5 trillion in tax revenues between 2012 and 2035, split evenly between state and local tax receipts and federal tax receipts.

From an environmental perspective, the country's increased reliance on natural gas (displacing coal) has already benefited produced results since carbon emissions hit a 20-year low in the first quarter 2012 according to the EIA. Natural gas typically has 40 percent less carbon content than coal, and 25 percent less carbon content than oil. But the gains from switching are often more substantial because of the high efficiency of natural gas notably for power generation purposes. To generate a fixed amount of power a best-in-class combined-cycle gas turbines (CCGT) will emit 60 percent less CO2 than a coal-fired plant.
The emissions of NOx from natural gas are typically 63 percent less than from oil and at least 60 percent less than for coal. The emissions of SOx from natural gas are almost negligible, and so are particulates.

Unconventional Resources: Reshaping the global gas market

Under IEA's scenario, the share of unconventional natural gas in the world gas production reaches 32 % in 2035 against 1 % in 2010 and makes Asia, in 2035, a larger gas producer than the Middle East or Russia. Altogether, unconventional gas represents nearly two-thirds of incremental gas supply to 2035. The demand, IEA estimates, will rise by 50% between 2010 and 2030.

Unconventional gas completely changes our understanding of the global distribution of the resource base with very substantial resources in North America, Australia, Europe, Latin America, South Africa and China among other places. The unconventional gas discoveries have roughly doubled the gas resource base.

In 2009, IEA estimated the "long-term global recoverable gas resource base" at 850 tcm against 400 tcm only a year earlier. Not just the US but parts of Europe, China, Argentina, Brazil, Mexico, Canada and several African countries, among others, dispose of quantities of gas that could transform their energy outlook.

Cooperation is crucial

The industry cannot develop this potential alone. The US shale gas experience shows that a comprehensive regulatory regime is the keystone for both successful operations and public acceptance. There is need for cooperation of policy makers in asserting stable policy frameworks and dispensing adequate regulations. Such regime is crucial to develop clear market terms, fundamental for the industry players to develop their business case to attract the significant investment needed. Effective regulation can also strengthen social acceptance and prevent legal disputes so local communities and consumers can capture the significant benefits flowing from this new energy resource.

IGU is active in sharing the US and Canadian industry feedback with its members and assisting them in implementing a regulatory framework that will contribute to a safe and environmentally respectful development of their shale gas resources.

Shale gas: Facts vs Environmental Concerns

The rapid development of the unconventional resources, however, has attracted, and continues to attract, significant and at times extreme attention. This attention is particularly related to the perceived and real environmental impacts of the extraction process. Negative attitudes, although often based on rational environmental concerns, may also translate emotional views on local community and resources safety. And as many fears, these are further nourished by a lack of knowledge. A rational, objective, fact-based discussion of the real environmental concerns, along with the approaches to ensure that this resource is developed in an environmentally responsible manner, is required. IGU, acting as the voice of the global gas industry, is to offer an objective, fact-based assessment of the key environmental concerns related to the unconventional gas development. IGU is also developing best practices to be adopted for a conscious exploration of this extraordinary resource.

The **hydraulic fracturing** (fracking) is a technique used to access natural gas deep underground in shale formations. It involves injecting pressurized water-based fracturing fluid into geologic formations to allow natural gas to escape the shale and to flow to production wells. It is comprised of 6 steps:

- Site development and preparation
- Vertical drilling
- Horizontal drilling
- Hydraulic fracturing
- Recycling of wastewater
- Well completion and operation
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Hydraulic fracturing has been extensively used since the 1950s. Recent innovations have been able to combine vertical and horizontal drilling with hydraulic fracturing to cost-effectively extract natural gas from shale formations. Despite hydraulic fracturing's strong record of safety and efficacy, there are some environmental concerns regarding the technique. On the next page, these concerns are addressed and facts presented.

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"Shale gas drilling takes up a large land-use footprint"	•Smaller land-use footprint than conventional natural gas, wind and solar •Common practice to drill multiple horizontal wells from one vertical well
"Hydraulic fracturing can have effects on drinking water"	•Vertical drilling is a well-established practice •Groundwater is protected during vertical drilling •Gas producing shale formations are 3-4000 meters below the water aquifers
"Hydraulic fracturing uses enormous quantities of water"	•Shale gas production requires less water than production of oil, coal and other forms of energy •Reduction of the amount of water used •Sourcing and use of water is heavily regulated
"Hydraulic fracturing fluids contain dangerous chemicals that are not disclosed to the public"	•Hydraulic fracturing fluid is comprised of 0.5% chemicals, many present in common household •The hydraulic fracturing fluid is controlled and doesn't contact fresh water. •Steps to voluntarily disclose fluid chemicals
"Hydraulic fracturing and associated wastewater disposal cause earthquakes"	•Intensity of seismic activity is 100,000 times less than levels detectable by humans
"Disposal of wastewater harms the environment"	•Underground injection is the primary disposal method for shale gas projects •The percentage of wastewater that is recycled is increasing
"Air emissions related to shale gas production are worse than those created by burning coal"	•Producing electricity from natural gas creates 36 to 47% lower GHG emissions than from coal •Contradiction in studies whether life-cycle GHG emissions for shale gas are higher than those for coal
"Shale gas extraction is not regulated"	•An extensive set of laws govern and regulate various aspects of shale gas development •US: Clean Water Act, Clean Air Act, Clean Drinking Water Act, etc.

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