

Shale Gas In Europe: A Transdisciplinary Approach
IASS, May 21-22, 2014
Workshop Statement

The IASS workshop “Shale Gas in Europe – A Transdisciplinary Approach” that took place on May 21-22 2014 aimed to identify and assess the main aspects of a potentially emerging shale gas industry in Europe while facilitating communication amongst key stakeholders and improving the understanding on pertinent issues involved. The participants came from Germany, the USA, the UK, France, Poland and Ukraine, and included representatives from science, governments, civil society and industry.

Four main themes were discussed and debated: The current status of shale gas developments in Europe, geopolitical and macroeconomic aspects, public engagement issues, and environment and technology. A number of key facts, arguments and open questions emerged from the discussions.

Status of shale gas exploration in Europe

- The Polish bureaucratic framework with regard to shale gas was discussed. The public acceptance of shale gas exploitation in the country is above 70% according to recent polls, and an early dialogue programme with local communities in some parts of the country helped foster engagement with the public. Estimates of shale gas reserves in Poland are still uncertain after approximately 50 wells drilled, raising doubts on the overall amount and technical recoverability.
- The UK government is enforcing legislation for shale gas investment and licensing, while the Economic Affairs Committee of the House of Lords reported in a recent document the possible economic impacts of shale gas production in the country. Estimates on shale gas resources will remain incomplete until exploratory wells are drilled. The firm political support and a patchy public acceptance coexist with active opposition from environmental NGOs.
- In Germany, the risk assessment of hydraulic fracturing has not found a consensus either among scientists or policy-makers, especially with regard to contamination of groundwater reserves. Lack of public acceptance on fossil fuels due to environmental risks and energy policy concerns (Energiewende) have generated a precautionary approach. In a recent development, the German Federal Ministries of the Environment and of Economics have published key principles for the regulation of fracking, with strong provisions regarding water protection (July 4, 2014).
- Ukraine had begun exploration for unconventional gas (shale gas, coalbed methane, tight gas) in 2011, and two Production Sharing Agreements (PSA) were signed in 2013. Both projects are in progress - two exploration wells are ready and third is in preparation - but the development of the Eastern project has been slowed down due to the crisis with Russia. Ukraine has also shown interest in its methane hydrates reserves (Ukrainian Black Sea).
- The European Commission (EC) is actively discussing new energy security strategies to decrease the member states’ reliance on imported gas. Shale gas production in Europe might represent a significant energy resource to tackle the future increase in energy dependence to a certain extent. EC recommendations published in January 2014 delineate how environmental risks can be minimised if proper measures and best practices are in place in the different member states.

Open Questions

- The first explorative well in Poland was drilled in 2010, but currently none of the 50 wells have shown commercial gas production potential. Can this be attributed to the low amount/recoverability of the Polish shale gas or other factors?
- To what extent could successful shale gas exploitation in one European country (e.g. Poland or the UK) influence shale gas-related decision-making in other countries?

Geopolitical and macroeconomic aspects

- The shale gas revolution in the US has led to a strong decrease in energy prices, significantly reducing the raw material costs for the US petrochemical industry. Industrial groups are claiming that this has contributed to the decision taken by some European energy-intensive and petrochemical companies to relocate parts of their production activities to the US. It was also argued that the decline in gas prices in the US is also due to short-term factors such as constraints on export capacities and the limited elasticity of natural gas consumption.
- Shale gas development in Europe could potentially increase European competitiveness and energy security, as well as counteract the monopoly of some suppliers. The results of the discussed models indicate that the future price for shale gas in Europe could range between 8 and 11 USD/MMBtu. It was suggested that, depending on the model assumptions, this could be potentially competitive with imported LNG and pipeline gas, and could lead to a certain reduction in gas and electricity prices.
- Even in scenarios with significant shale gas production, the European natural gas import dependency will remain high. Moreover, irrespective of shale gas developments, Europe needs a comprehensive energy strategy combining such policies as improved energy efficiency and completion of the internal market. Shale gas could play a complementary role in this strategy.
- Currently, the availability of cheap coal in Europe undermines not only the nascent shale gas industry but the natural gas industry as a whole. Increased coal usage in certain member states also jeopardises GHG emissions reduction targets. Higher prices for emission quotas could help level off inter-fuel competition.

Open Questions

- To which extent could shale gas production lead to a decrease in gas prices in Europe?
- Could shale gas exploitation offset declining domestic gas production in Europe?
- Can shale gas production enhance European energy security?

Public Engagement

- Public engagement is crucial for the development of successful energy policies since transformations in the energy sector usually affect a broad stakeholder community. There is a strong need to engage the public into the discussion and inform it comprehensively about the pros and cons of shale gas exploitation. It was highlighted that the shale gas debate is not always sufficiently fact-based.
- For example, the Pomorskie Voivodeship in northern Poland has established a platform for dialogue and information, called "Together about Shales" ("Razem o łupkach") Local inhabitants, representatives of local authorities, investors, concession-holders and interested stakeholders take part in regular dialogue sessions. Local citizens are involved in the early stages of the decision making

process and are able to shape agreements between government and industry. This model for public engagement in the northern part of Poland may be rolled out across the country in the future.

- In the UK, the Department for Communities and Local Government (DCLG) is engaging with the public on the shale gas discussion. The focus, content and intensity of the discussions on shale gas are very much depending on the different communities (place matters). Public engagement could be fostered by a greater involvement of representatives from science, technology, and engineering, which could then lead to a more fact-based discussion. In the UK, shale gas is currently promoted through the lens of energy security, as well as in relation to energy justice and social sustainability.
- The German “Information- & Dialogue process” was initiated and funded by ExxonMobil serving as a platform for exchange of information. Within this dialogue process and through direct communication with industry, the public could gain technical knowledge on shale gas (experts independent from ExxonMobil were invited to analyse the risks related to fracking) and voice their concerns.

Open Questions

- What should be the respective role of local and national authorities in enabling public engagement on shale gas exploration processes?
- Should the legal status and impact of these public engagement programmes be reinforced? Or should it remain a voluntarily-based process?

Technology and environment

- It was highlighted that data gaps exist, and that environmental issues linked to shale gas seen in the USA, e.g. fugitive methane emissions, are poorly monitored. Early attempts at plugging data gaps across the life cycle (production, processing, transmission/storage, distribution, and from trucks and stations) are beginning to show that accuracy of estimates made in the past 5 years is varied.
- Quantifying and mitigating potential methane emissions in any shale gas development in Europe would have to be a priority. Technology exists for this to be done effectively. The issue of cost was raised as a factor which has prevented this being utilised on large scale in the USA, along with the fact that existing legislation does not make emissions-measuring mandatory there.
- The occurrence of micro seismic events during hydraulic fracturing of reservoirs to enhance permeability is unavoidable. Numerical modelling research presented could be used in development of a ‘soft stimulation’ technique during fluid pumping to create higher permeability with less induced seismicity. This is not yet verified with field or large-scale lab tests.
- Water challenges in relation to fracturing fluids, water usage and water recycling were discussed. Fracturing fluids composition and formula are highly variable, mostly depending on the shale’s mineralogy; more environmentally friendly chemicals are also being developed by research and industry. Technologies to reduce environmental footprint and optimise chemical and water resources are available and currently used in industry when the regulatory framework requires it.
- Alternative fracturing fluids such as those using carbon dioxide or nitrogen to reduce water consumption were discussed. Improving hydraulic frac design efficiency and innovative drilling and fracturing techniques were brought up in this context. Surface and subsurface potential contamination pathways were also illustrated.

Open Questions

- Can environmental data gaps seen in the US be avoided in Europe?
- Are new technologies for fracturing fluids and water treatment and recycling uniform across industry?

Overarching topics and questions

In addition to these points, several overarching topics with cross-cutting implications arose from the discussions.

- Importance and limits of 'lesson-learning' from the US: although there are some valuable lessons to learn from the US experience, there is a clear difference between the US and Europe in terms of geology, economy, regulatory environment, politics, etc. In particular, no direct parallels can be drawn between legislation and regulatory framework, for example with regards to environmental issues.
- This factor, combined with the persisting uncertainties regarding the precise amount of recoverable reserves, hinders efforts at modelling the possible future economic and environmental repercussions of shale gas exploitation in Europe.
- One less uncertain consideration is the fact that shale gas exploitation in Europe will not replicate a 'boom' of a magnitude akin to that in the US, in terms of both production levels and speed of development.
- Developments in Poland and the UK will provide additional experience that could help better our understanding of both risks and benefits, as could scientific pilot projects elsewhere in Europe.
- NGOs engagement in the shale gas discussion has often promoted advancements in fracking fluid design and environmental awareness within industry. What will be the role of European NGOs in the shale gas environmental debate going forwards?
- An important question that underlined discussions throughout the workshop is the interaction between shale gas (and more widely natural gas) and energy policies that adhere to the GHG emissions reduction targets, a topic that goes beyond the environmental risks related to hydraulic fracturing *per se*. Could shale gas act as a bridging resources to sustainable scenarios (e.g. through coal substitution)? Or would it just perpetuate our reliance on fossil fuels and push climate change mitigation goals further down the road? As a subset of this issue, the compatibility or incompatibility of shale gas with the further deployment of renewable energy sources (RES) was debated, particularly in relation to subsidies.
- The answer to these question also depends on the future availability (or lack thereof) on a commercial scale of technologies for the mitigation of CO₂ emissions from natural gas utilisation. In this context, Carbon Capture and Sequestration (CCS) and Carbon Capture and Utilisation (CCU) schemes were discussed, as well as innovative approaches such as the IASS research project on "methane cracking", a technology for the production of hydrogen from natural gas without CO₂ emissions.

In bringing together scientists, experts and practitioners from different backgrounds, this workshop provided an opportunity to better our understanding of the shale gas issue, notably by ascertaining some key facts and identifying accurately the remaining uncertainties and open questions. These represent target areas for scientific research, as well as opportunities for further dialogue among all stakeholders. Indeed, the combination of scientific evidence and societal perspectives through this transdisciplinary approach is an important component of providing the right basis for decision-making.