What is the scope for the development of shale gas resources in the EU?

There are several reasons why the development of shale gas resources will remain extremely limited or non-existent.

A first reason is the limited understanding of the geological deposits of unconventional gas in Europe’s underground, compared to American states like Texas and Pennsylvania with more than a century of onshore oil and gas drilling. And even despite the wealth of data in the US, estimates of unconventional gas resources – and the technically recoverable reserves in particular – remain more art than science. Based on revised data about unconventional gas drilling and production by the US Geological Survey, the US Energy Department cut its estimate for natural gas reserves in the Marcellus shale formation by 66 percent, down from about 12 to 4 trillion cubic meters. Instead of covering about 17 years of gas demand based on the 2010 consumption rate, the technically recoverable reserves from the Marsellus shale play would only be able to supply 6 years of US gas demand. Hence, it comes as no surprise that the Polish shale gas reserves – given a much more limited knowledge about unconventional reserves – were overestimated by a factor 10: The initial estimate by the United States’ Energy Information Administration (EIA) of technically recoverable shale gas resources in Poland of 5.3 trillion cubic meters were dramatically reduced by the Polish Ministry of the Environment to a range of technically recoverable reserves of 346 to 768 billion cubic meters.

Another major source of uncertainty about the potential of shale gas is the figures about the “estimated ultimate recovery” (EUR) of unconventional gas. The EUR of e.g. shale gas wells is a primary source of uncertainty, as there are no long-term production data available to serve as a basis for predicting how rapidly shale gas production will decline

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1 See also http://www.oxfordenergy.org/2010/12/can-unconventional-gas-be-a-game-changer-in-european-gas-markets/
Experts in subsurface petroleum geology, such as Arthur Berman, have advised investors and policy-makers to realize that production figures of shale gas exhibit rapid decline in the first years of the operation of the shale gas well. This represents a fundamental difference between conventional and unconventional gas: The production of a shale gas well declines quickly in the first 2 years with a very low level of production afterwards. This sharp decline has 2 implications. First of all, unconventional gas, including shale gas, requires many wells to be drilled. To give an idea, the United States Energy Information Administration estimates that extracting the technically recoverable resources of shale gas (as well as tight oil reserves) would require drilling and fracking over 630,000 new wells. Even a fraction of such an extraordinary amount of drilling has never been experienced anywhere in Europe. Such intensive levels of drilling in more densely populated areas – compared to United States – will face major challenges in terms of public acceptability. Secondly, as production volumes of shale gas wells decline rapidly, drilling needs to continue without any interruption to keep up overall production volumes and to supply a constant share of a country’s or a region’s gas supply. In other words, if drilling stops, the supply of shale gas on Europe’s gas will drop precipitously and lead to a spike in gas prices. Conversely, even continuous drilling will only lead to a production ‘plateau’ in terms of shale gas’ contribution to a country’s or regions’ supply of natural gas. The following graph from the Annual Energy Outlook of the Energy Information Administration illustrates both points.

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5 [http://www.eia.gov/forecasts/aeo/IF_all.cfm](http://www.eia.gov/forecasts/aeo/IF_all.cfm) (page 59)
6 [http://www.eia.gov/forecasts/aeo/IF_all.cfm](http://www.eia.gov/forecasts/aeo/IF_all.cfm) (page 59)
Thirdly, technically recoverable reserves do not give any indication about the extent to which shale gas development is a commercially viable enterprise, which depends on two main factors: The cost of drilling and the revenue from gas prices. Gas prices are relatively high in Europe, at about 230 Euro per 1000 cubic meters compared to about 100 Euro per 1000 cubic meters in the United States in 2012. These relatively high gas prices could justify shale gas drilling in Europe despite higher production costs. However, experts such as Florence Geny hold that “[d]rilling costs [in Europe] are expected to be 2 to 3 times higher than in the US”, around 7.5 Euro/MBtu to 9 Euro/MBtu. Many factors that facilitated relatively low production costs in the United States, are absent in Europe: the presence of trained personnel specialized in exploration and production of oil and gas, the availability of drilling rigs with at least 1000 HP capable of deep drilling as well as pressure pumps capable of pumping at pressures of at least 10,000 HP, the bigger size of farm plots and fewer land owners in the US compared to Europe whose land is impacted by the drilling, the lack of pipelines to transport the gas from shale plays to centers of gas consumption, etc.

Fourthly, there continues to be considerable uncertainty about the regulatory framework for unconventional hydrocarbon extraction in Europe. The 2013 work-programme of the

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8 http://ec.europa.eu/dgs/jrc/index.cfm?id=1410&dt_code=NWS&obj_id=15260&ori=RSS
European Commission is planning both legislative and non-legislative initiatives to develop an “Environmental, climate and energy assessment framework to enable safe and secure unconventional hydrocarbon extraction”. This could lead to the introduction of new rules about the requirements for mandatory environmental impact assessment, environmental liability of shale gas operators, new rules on methane emissions and obligatory use of 'completion combustion devices', updated provisions on fracking chemicals under REACH, new requirements for seismic monitoring, new regulations to improve well integrity, new initiatives to price carbon emissions in Europe, new initiatives on water treatment of flowback water, etc. The International Energy Agency’s 2012 report on “Golden rules for a golden age of gas” indicates that applying such measures “would add 7% to the cost of the average shale-gas well”.

Given the many geological, industrial and regulatory uncertainties, shale gas and other unconventional gas resources will require a long time to develop to make a significant contribution to Europe’s gas consumption. Industry sources indicate that shale gas could make a significant contribution at the earliest in the period 2020 to 2030, after which the EU’s should be well on its way to a complete decarbonisation. Investing now and in the coming decade in the development of a major industrial infrastructure based around unconventional hydrocarbons is incompatible with the EU’s long-standing commitment to decarbonize its economies by 2050.

Until all these problems and the environmental risks and negative impacts associated with large-scale shale gas development in Europe are adequately addressed, we believe that no further shale gas, shale oil and coal bed methane activities should proceed. We call on all Member States to suspend all ongoing activities, to abrogate permits, and to place a ban on any new projects, whether exploration or exploitation. For European Union institutions like the European Investment Bank to invest in this unconventional gas industry and lending its resources to help extract e.g. shale gas in Europe would be a very risky proposition given the many uncertainties surrounding this ‘unconventional’ development.

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9 [http://www.worldenergyoutlook.org/goldenrules/]
To conclude, the European Investment Bank should take note of the following paragraph in a 2012 resolution of the European Parliament on the environmental impacts of shale gas:

- “16. Reiterates its call to the Commission and the Member States, expressed in its resolution of 15 March 2012 on a Roadmap for moving to a competitive low carbon economy in 2050, to push for a faster implementation of the G-20 agreement on removing fossil fuel subsidies; considers that exploration and exploitation of fossil fuel sources, including unconventional sources, must not be subsidised from public funds [my emphasis]”\(^\text{10}\)

Another resolution by the European Parliament also clearly states that the shale gas industry itself should be responsible for developing the necessary support infrastructure:

- “7. Notes, on the other hand, that significant investments are needed for the establishment of all the necessary infrastructures related to the drilling and to the storage, transport and reprocessing of gas and fracking fluid, which have to be entirely covered by the industry [my emphasis]”\(^\text{11}\)

Do you expect the share of natural gas in EU primary energy consumption to grow further?

Yes, but developing unconventional gas resources – even on a large scale – will do little to dramatically reduce the EU’s reliance on imports. A better strategy would be quickly decarbonize the EU’s economies through an aggressive investment in renewables and energy efficiency.

What would be the best approach to increase security of gas supply and reduce import dependency?

See the previous question. The best approach would be quickly decarbonize the EU’s economies through an aggressive investment in renewables and energy efficiency.


Given the large uncertainty on future gas demand, what is the risk that investment in natural gas infrastructure may be stranded?

The question implies already the answer. There is a large uncertainty as to what Europe’s future gas needs will be. In addition and as explained above, there is great uncertainty as to whether unconventional gas could ever make up the share of the declining domestic conventional gas production volumes in Europe’s overall supply of natural gas.