M4ShaleGas: Measuring, monitoring, mitigating & managing the environmental impact of shale gas

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The European Commission's Energy Roadmap 2050 identifies gas as a critical fuel for the transformation of the energy system in the direction of lower CO2 emissions and more renewables energies. Shale gas is – by definition –natural gas found trapped in shale, a fine grained sedimentary rock. There are, however, several concerns related to shale gas exploration and production, many of them being associated with hydraulic fracturing operations that are performed to stimulate gas flow in the shales. Potential risks and concerns include the fate of chemical compounds in the used hydraulic fracturing and drilling fluids, their potential impact on shallow ground water reserves used for drinking water and small magnitude earthquakes that may be induced by the fracturing process and may raise public concern if felt at the surface. There is also an ongoing debate on greenhouse gas emissions released during shale gas exploration and production and its climate impact compared to other energy sources. *M4ShaleGas* is a EC Horizon 2020 project funded by the European commission to address the specific challenge related to *understanding, preventing and mitigating the potential environmental impacts and risks of shale gas exploration and exploitation.* The general objective is to provide scientific recommendations for minimizing the environmental footprint of shale gas exploration and exploitation in Europe. M4ShaleGas will provide a scientific knowledge base, integrating the work of 18 research institutes covering many different topographical, geological and geopolitical regions in Europe. Consultations with different stakeholders (i.e. public, regulators, governments and industry) by these research institutes has identified a number of key knowledge gaps related to the potential environmental risks and impacts of shale gas exploration and exploitation. These key gaps are (1) the need for a research-based understanding of differences between Europe, US and Canada resulting from differences in their geological and geopolitical settings, (2) the need for quantitative risks assessment and mitigation of risks and impacts that are specific for Europe, (3) lack of knowledge on the applicability of US and Canadian best practices to Europe, and (4) insufficient research-based knowledge on public perceptions of risks and impacts in Europe. Topics covered by M4ShaleGas, and addressed in dedicated subprojects, include impact from subsurface processes (e.g. hydraulic fracturing and well integrity), impact from surface processes (groundwater contamination, soil contamination, impact on the atmosphere (e.g methane and CO_2 emissions) and the impact on the society (e.g. public perception). The recommendations will be of vital importance to all stakeholders in shale gas activities; as a scientific basis for public discussion on the costs and benefits of shale gas as well as an information platform for regulators, policy makers and industry. It will integrate existing knowledge based on US and Canada practices with new knowledge on shale gas exploration and exploitation that is specific for Europe. It would, therefore, play an important role in determining the fate of shale gas in Europe.